

CH2MHILL

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September 15, 2003

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REC'D
SEP 15 2003
RCAP

Subject: Indoor Air Quality Assessment Report
Results of March 2003 Indoor Air Quality Assessment
Modine Manufacturing Company
Camdenton, Missouri

Dear Ms. Kump-Mitchell:

Please find enclosed three copies of the above-referenced report that CH2M HILL is submitting on behalf of Modine Manufacturing Company. The report presents the findings from the indoor air sampling activities conducted in March 2003. Please feel free to call Tom Sanicola (262-636-1649) or me (314-421-0313 Ext. 265) with any questions you may have.

Sincerely,

CH2M HILL

Daniel J. Price, R.G.
Project Manager

stl\MDNRcoverletter.doc

- c: Thomas Sanicola - Modine Manufacturing Company (2 copies)
Steven Poplawski - Bryan Cave LLP (1 copy)
David Garrett - EPA Region VII (2 copies)
Scott Moyer - Hamilton Sundstrand (1 copy)
John Hooker - SECOR (1 copy)
Robert Zimmer - MACTEC (1 copy)

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RCRA RECORDS

Indoor Air Quality Assessment Report

Results of March 2003

Indoor Air Quality Assessment

Submitted to
Modine Manufacturing Company

September 2003

CH2MHILL

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1 Introduction

This report summarizes the activities and findings of the Indoor Air Quality (IAQ) Assessment conducted during March 2003 at the Modine Manufacturing Company (Modine) facility in Camdenton, Missouri. The IAQ Assessment was conducted as a continuation of the Corrective Action work conducted pursuant to the Missouri Department of Natural Resources (MDNR) Corrective Action Abatement Order on Consent issued in July 1999, the Corrective Action Work Plan and three subsequent addenda approved by MDNR.

The IAQ Assessment was conducted in accordance with the Corrective Action Work Plan Addendum 3 (CH2M HILL, December 2002) submitted to the MDNR in December 2002. Comments provided by MDNR were addressed and incorporated into the project activities. Verbal and subsequent email approval of the work plan with modifications was provided by MDNR in March 2003.

1.1 Background and History

Modine manufactures heat transfer products at the Camdenton facility located at 179 Sunset Drive, southwest corner of Sunset Drive and Dawson Road (Figure 1). Several investigations were conducted to identify the nature and extent of the contamination from chlorinated VOCs in subsurface soil at the site. Based on the results of these investigations, corrective actions were implemented as summarized below.

- In October and November 2001, excavation was performed of soil impacted with chlorinated VOCs in excess of MDNR Cleanup Levels for Missouri (CALM) Soil Target Concentrations (STARC) Leaching to Groundwater (C_{LEACH}) levels. Approximately 4,800 cubic yards of soil were excavated, segregated, and stockpiled. Of that volume, 3,000 cubic yards exceeded the STARC levels.
- Because the volume of impacted soil was significantly more than originally estimated, excavation activities ceased and a subsurface investigation was implemented to better define the extent of impacted soil.
- Based on the investigation, alternative site-specific soil cleanup action levels were developed.
- In early March 2002, a total of 2,812 tons of impacted stockpile soil from the October/November, 2001 excavation, was disposed of as special waste.
- In May and June 2002, 4,614 tons of VOC impacted soil exceeding site-specific cleanup levels was excavated and transported to a landfill for disposal as a special waste and the site was restored.

1.2 Air Quality Assessment

An indoor air quality assessment was requested by MDNR, to complete an Environmental Indicator (EI) determination (Current Human Exposures Under Control) for the Modine

facility. The Environmental Indicator program is used by the Environmental Protection Agency (EPA) to track progress at sites under the RCRA Corrective Action Program.

Results from previous investigations indicated the possibility that residual chlorinated VOC concentrations below the site specific action levels could be present in the soil beneath the Modine facility. Thus, a potential pathway existed for contamination to migrate from residual VOCs in the soil to the air inside the plant. The objective of the IAQ assessment was to investigate this potential pathway and determine if unacceptable human exposure to VOCs migrating to indoor air from soil was occurring at the facility.

The use of the Johnson and Ettinger model (USEPA, 2000) was originally proposed to make the EI determination. However, direct measurement was considered to be a more appropriate method for evaluating the potential exposure pathways and, with the concurrence of MDNR, indoor air sampling was proposed for evaluating potential human exposure pathways at the facility related to VOC migration from soil.

2 IAQ Assessment

The IAQ Assessment tasks included work planning activities and sample collection.

2.1 Work Planning Activities

As part of the work-planning process, a pre-sampling assessment of the facility was conducted to determine the most appropriate sampling locations. The assessment consisted of a review of facility plans and an interview with Modine plant management to delineate areas of interest for air sampling within the Modine plant. The assessment differentiated specific areas of the plant based on separate heating, ventilation, and air conditioning (HVAC) systems, plant construction and renovation details, equipment locations and current usage of plant areas.

Sample locations were selected where a higher potential was assumed to exist for air transfer between the soil beneath the building and the indoor air (i.e., areas where floor breaches occur), and where prior activities at the facility may have caused subsurface contamination. Additionally, at least one sample was collected in each of the three separate HVAC system service areas at the plant.

Prior to submittal of the Work Plan, Modine proposed comparing the analytical results from the air sampling to 1% of the Occupational Safety and Health Administration (OSHA) standard for protection of worker health. At the request of MDNR, the Work Plan presented risk-based screening levels based on a worker exposure scenario for data comparison purposes. Consequently, the analytical method for sample analysis was modified to lower the analytical detection limits for the Chemicals of Concern (COCs), in order to accommodate the lower comparison levels.

Work Plan Addendum 3 - Corrective Action Indoor Air Quality assessment was prepared and submitted to the MDNR in December, 2002. The Work Plan specified sampling indoor air for three residual COCs that were found in soil at the facility during the previous investigations: trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride. Collection of air samples from six locations within the Modine facility, with one duplicate and one blank sample were proposed in the Work Plan.

Following review of the Work Plan, MDNR requested additional modifications in a letter dated February 28, 2003. Modine submitted a written response on March 3, 2003; and the following modifications were agreed upon verbally and documented in an email from MDNR on March 7, 2003. Those modifications were:

- Collection of an ambient outdoor air sample
- Comparison of results to both industrial and residential risk-based target concentrations.
- The addition of five constituents to the analyte list: 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), tetrachloroethene (PCE), and methylene chloride.

It should be noted that the Work Plan Addendum 3 was not changed and re-issued to reflect these modifications. Final agreement between Modine and the MDNR to the modifications listed above was reached on March 7, 2003. MDNR's concurrence letter was dated March 24, 2003.

2.2 Air Sampling Locations

As agreed upon, air samples were collected from six locations within the Modine facility and one outside of the facility. One duplicate sample and one blank sample were also collected. Air sampling locations are identified below and shown on Figure 2:

- MD-AS-01 was collected in the main conference room of the office wing located at the northeast corner of the building.
- MD-AS-02 was collected behind the women's restroom, near the sinks and one floor drain at the northwest corner of the building.
- MD-AS-03 was collected under the conveyor belt in the northeast section of the plant close to the oven room and a six-foot deep concrete lined pit that drains to the pre-treatment waste line.
- MS-AS-04 was collected in the training room near the chemical storage area on the west side of the building.
- MD-AS-05 was collected on a storage shelf, approximately 5 feet above the floor, next to the welding bays in the center of the plant. Duplicate sample MD-AS-08 was also collected at this location.
- MD-AS-06 was collected in the south section of the plant within the footprint of the historical monorail degreaser. The former monorail degreaser was once a below surface grade production operation using volatile organic chemicals. The area was renovated and is now covered with grade-level concrete flooring.
- MD-AS-07 was collected outside the building, away from potential VOC sources (propane tanks, loading dock, etc.), in a grassy area near the southeast corner of Modine property.
- MD-AS-B1 was the blank sample stored in the multipurpose room in the office wing of the plant throughout the sampling event.

2.3 Sampling Procedures

The Indoor Air Quality Assessment sampling attempted to approximate potential 'worst case conditions' for the soil to indoor air exposure pathway. The state of Massachusetts (MADEP, 2002) has identified some generic conditions under which greater vapor migration from soil or groundwater may occur. These conditions are:

- Highest potential for vapor migration is during late winter/early spring.
- Indoor temperatures are 10 degrees F greater than outdoor temperatures.
- Winds greater than 5 miles per hour.

- Soils around the building saturated by precipitation.
- Mechanical heating system in operation.
- Mechanical fans off and doors and windows closed.

While it is not well understood how these environmental conditions may affect the magnitude of vapor intrusion, the attempt was made to conduct the IAQ assessment under conditions when significant vapor migration from soil could be expected to occur. Specifically, the IAQ assessment was conducted on March 19-20th 2003. The average temperature over the two-day period was approximately 52 degrees Fahrenheit in Columbia, Missouri located approximately 90 miles north (National Weather Service).

Air samples were collected using 24-hour integrated canister sampling. The use of canisters ensured that a sample could be collected over the time period necessary (24 hours) and enabled the subsequent laboratory analysis of the specific COCs at the desired detection limits. This method involved placing an evacuated stainless steel canister in each of the sample locations. Each canister had a preset sampling flow rate, established accurately by the laboratory. After the valve was opened, the canister continuously collected an air sample over the 24-hour period until the valve was closed. Refer to Appendix A, Standard Operating Procedure for Canister Integrated Sampling, for additional details.

Canister vacuum was measured in the field prior to sampling using a vacuum gauge. The canisters were then set in place at each sample location, and the valve opened to allow the sampling to commence at the pre-set flow rate. Canisters were checked periodically and were found to be operating without interference. After the 24-hour samples were collected the final vacuum on each canister was measured and the valves were tightly secured. The canisters were shipped back to the laboratory for analysis via overnight delivery.

The blank sample canister (MD-AS-B1) was measured for start and ending vacuum with the same gauge as all other samples. Canister vacuum measurements were made in the multipurpose room in the office wing. The blank sample canister remained in the multipurpose room with the valve closed during the sampling event.

2.4 Sample Analysis

Samples were analyzed by the CH2M HILL Applied Science Group Laboratory in Corvallis, Oregon. Two analytical methods were performed on each sample. USEPA Method TO-14 for volatile organic compounds was performed using a gas chromatograph with a mass spectrometer detector (GC/MS). This analysis provided adequately low detection limits for five of the eight COCs. Selected Ion Monitoring (TO-14 SIM) was conducted for three analytes - PCE, TCE, and vinyl chloride. The SIM analysis enabled lower detection limits to be achieved for these COCs. Table 1 lists the COCs and the analytical reporting limits used for this project. Reporting limits are reported in units of parts per billion by volume (ppbv).

Table 1: Chemicals of Concern (COCs)

| Chemical of Concern | Analytical Method Detection Limit (ppbv) |
|--------------------------------------|--|
| 1,1-dichloroethane (1,1-DCA) | 1 |
| 1,1-dichloroethene (1,1-DCE) | 1 |
| cis-1,2-dichloroethene (cis-1,2-DCE) | 1 |
| methylene chloride | 1 |
| tetrachloroethene (PCE) | 0.005 |
| 1,1,1-trichloroethane (1,1,1-TCA) | 1 |
| trichloroethene (TCE) | 0.004 |
| vinyl chloride | 0.004 |

The sample canisters were tested by the laboratory prior to shipping. Each canister contained SIM analysis constituents at concentrations less than the laboratory reporting limit (i.e., 0.004 ppbv). The nine canister certifications are provided in Appendix B. The canister certification initially reported for one canister (can 544) was from the wrong date and showed an unacceptable level of PCE. The correct certification showed all compounds met the levels for certification. The correct certification for this canister is included with this report.

3 Analytical Results

The analytical results from the March 2003 sampling of indoor and outdoor air at the Modine facility are presented in Table 2 in units of ppbv. Also included in the table are comparisons with appropriate occupational exposure limits. These limits are discussed in the following paragraphs. Laboratory analytical data sheets are provided in Appendix C.

Indoor Samples

Low concentrations of five COCs (TCE, PCE, cis-1,2-DCE, vinyl chloride, and methylene chloride) were detected in the indoor air samples.

TCE and PCE were detected in samples from each of the six indoor locations. The maximum detected concentrations were 61.5 ppbv for TCE in sample MD-AS-02, and 0.602 ppbv for PCE in sample MD-AS-05. The occupational exposure limit is 50,000 ppbv for TCE and 25,000 ppbv for PCE. As a result, the maximum detected concentrations of TCE and PCE are 0.1 percent and 0.002 percent, respectively, of the occupational exposure limit.

The concentrations of cis-1,2-DCE, vinyl chloride, and methylene chloride were each less than 0.01 percent of their respective occupational exposure limits.

The duplicate sample, MD-AS-08, was submitted blind to the laboratory. Analysis results corroborated those of MD-AS-05.

Outdoor Sample

TCE and PCE were detected in the outside sample at concentrations of 0.204 ppbv and 0.053 ppbv, respectively. The VOC concentrations found in the outside sample are consistent with ambient background concentrations found in other parts of the country. For example, documented background TCE concentrations have been measured as high as 0.2 ppbv.

Blank Sample

A detection of TCE, at 0.025 ppbv, was detected in the blank sample, MD-AS-B1. This result was noticeably higher than the precertification value for the canister.

Table 2: COC Detection Table - March 2003

| Field ID | Description | Analytical Method | Analyte | Result (ppbv) | Lab Q | Result/ Occupational Exp. Limit (%) | Occupational Exposure Limit, (ppbv) |
|----------|--|-------------------|------------------------|---------------|-------|---|---|
| MD-AS-01 | Office wing conference room | TO14 | Methylene chloride | 1.1 | | 0.005 | 25,000 |
| | | TO14-SIM | Tetrachloroethene | 0.2 | | 0.001 | 25,000 |
| | | TO14 | Trichloroethene | 14.6 | | 0.03 | 50,000 |
| MD-AS-02 | Office wing restroom sink area | TO14 | Cis-1,2-Dichloroethene | 0.9 J | | 0.000 | 200,000 |
| | | TO14 | Methylene chloride | 0.6 J | | 0.003 | 25,000 |
| | | TO14-SIM | Tetrachloroethene | 0.517 | | 0.002 | 25,000 |
| | | TO14 | Trichloroethene | 61.5 | | 0.1 | 50,000 |
| MD-AS-03 | NE plant corner | TO14-SIM | Tetrachloroethene | 0.578 | | 0.002 | 25,000 |
| | | TO14 | Trichloroethene | 46.7 | | 0.09 | 50,000 |
| MD-AS-04 | Training room near chem. storage area | TO14-SIM | Tetrachloroethene | 0.443 | | 0.002 | 25,000 |
| | | TO14 | Trichloroethene | 56.5 | | 0.1 | 50,000 |
| | | TO14-SIM | Vinyl chloride | 0.009 | | 0.001 | 1,000 |
| MD-AS-05 | Center of plant near welding bays | TO14-SIM | Tetrachloroethene | 0.602 | | 0.002 | 25,000 |
| | | TO14 | Trichloroethene | 42.2 | | 0.08 | 50,000 |
| | | TO14-SIM | Vinyl chloride | 0.015 | | 0.002 | 1,000 |
| MD-AS-06 | S end of plant in historical degreaser location | TO14 | Cis-1,2-Dichloroethene | 0.6 J | | 0.000 | 200,000 |
| | | TO14 | Methylene chloride | 0.8 J | | 0.003 | 25,000 |
| | | TO14-SIM | Tetrachloroethene | 0.528 | | 0.002 | 25,000 |
| | | TO14 | Trichloroethene | 34.6 | | 0.07 | 50,000 |
| MD-AS-07 | OUTSIDE SAMPLE | TO14-SIM | Tetrachloroethene | 0.053 | | 0.000 | 25,000 |
| | | TO14-SIM | Trichloroethene | 0.204 | | 0.000 | 50,000 |
| MD-AS-08 | Duplicate of MD-AS-05 | TO14-SIM | Tetrachloroethene | 0.582 | | 0.002 | 25,000 |
| | | TO14 | Trichloroethene | 42.7 | | 0.09 | 50,000 |
| | | TO14-SIM | Vinyl chloride | 0.015 | | 0.002 | 1,000 |
| MD-AS-B1 | Blank | TO14-SIM | Trichloroethene | 0.025 | | 0.000 | 50,000 |

Notes:

J = The analyte was positively identified but the reported value is estimated.

Occupational Exposure Limit value is the lowest of the OSHA PEL, ACGIH TLV or NIOSH REL.

OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit

ACGIH TLV = American Council of Governmental Hygienists Threshold Exposure Limit

NIOSH REL = National Institute for Occupational Safety and Health Recommended Exposure Limits

4 Conclusions

The current guidance for Human Exposure Under Control EI determinations is the EPA Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (USEPA, November 2002). This guidance was developed for use in residential settings and contains no methodology or screening levels for evaluating potential vapor intrusion pathways in workplaces. The EPA does not expect this guidance to be used for settings that are primarily occupational. The draft guidance states "OSHA and EPA have agreed that OSHA generally will take the lead role in addressing occupational exposures. Since, workers will generally understand the workplace (e.g., OSHA) regulations (and monitoring, as needed) that already apply and provide for their protection."

Consequently, the EI determination for the indoor air pathway in workplaces has been based on comparison of canister sampling results to occupational standards. OSHA establishes Permissible Exposure Limits (PELs) as their screening level for workplace exposures based on an 8-hour time weighted average (TWA) concentration.

Modine has taken a more conservative approach and is using the lower value from the following sources for comparison to the IAQ assessment results and to demonstrate achievement of the EI: (1) regulatory established OSHA Permissible Exposure Limit (PEL), (2) guidance exposure limits established by National Institute of Occupational Safety and Health (NIOSH) - Recommended Exposure Levels (RELs), and (3) guidance exposure limits established by the American Conference of Governmental Industrial Hygienists (ACGIH) - Threshold Limit Values (TLVs).

Concentrations of VOCs detected in the Modine facility were well below the lowest available occupational exposure level. Concentrations of the five COCs found during the IAQ assessment were all less than 1% of the lowest occupational exposure limit. Based on the most conservative comparison of measured concentrations to occupational exposure limits, there are no "unacceptable human exposures to contamination (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)". Therefore, the Modine Camdenton facility achieves compliance with the Environmental Indicators for Human Exposure Under Control. Documentation for Environmental Indicator Determination - Current Human Exposures Under Control is provided in Appendix D.

5 Methods for Assuring Environmental Indicator for Human Exposure Under Control

Concentrations of VOCs detected indoors in a workplace setting will be addressed as part of the Camdenton facility's occupational safety and health program regulated under OSHA, in accordance with EPA's draft vapor intrusion guidance.

Based on the findings, there is no unacceptable human exposure to contamination for workers within the facility. However, in response to the VOCs measured during the IAQ assessment, Modine has taken the following steps to ensure that potential future exposure of workers to these VOCs in indoor air remains controlled:

- Add the five constituents to the existing Hazard Communication Program and notify workers about these findings, and
- Add the five constituents to the existing annual exposure monitoring program and collect air samples and analyze them for these constituents.

5.1 Annual Health & Safety Monitoring Air Sampling

Indoor Air Sampling was conducted by Modine as part of ongoing Health and Safety program activities at the plant in August 2003. Annually, personnel monitoring is conducted for the constituents identified in the facility's Hazard Communication Program (HCP). The HCP was revised at the Camdenton facility to incorporate the five COCs that were detected in the March 2003 IAQ assessment. (If, after three years of monitoring, concentrations have not been observed above OSHA standards the annual monitoring requirement for these constituents will be discontinued.)

The monitoring consisted of two area samples collected from stationary locations in the western portion of the plant. Samples were collected in accordance with NIOSH sampling methods by drawing air through charcoal sorbent tubes with personal sampling pumps calibrated to sample at a flow rate of 0.34 Liters/minute. NIOSH analytical methods (Methods 1003, 1005, 1007, and 1022) were used to analyze for the five COCs incorporated into the HCP.

5.2 Annual Health & Safety Monitoring Sampling Results

The NIOSH method analytical results from the occupational air quality sampling at the Camdenton facility are presented in Appendix E. A total of four samples were collected over an approximate 8-hour period. Samples were collected from the north end of the paint area and at the turret press at the west end of the welding area (Figure 2). One sample was collected from each location on successive days (August 11 and 12, 2003).

Concentrations for all five COCs (TCE, PCE, cis-1,2-DCE, vinyl chloride, and methylene chloride) were below NIOSH method detection limits.

SECTION 6

6 References

American Society for Testing and Materials (ASTM). *Standard Guide for Air Sampling Strategies for Worker and Workplace Protection*. (E1370-96). West Conshohocken, Pennsylvania. March 1996.

American Society for Testing and Materials (ASTM). *Standard Test Method for Determination of Volatile Organic Chemicals in Atmospheres (Canister Sampling Methodology)*. (D5466-95). West Conshohocken, Pennsylvania. February 1996.

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Massachusetts Department of Environmental Protection. *Indoor Air Sampling and Evaluation Guide*. WSC Policy # 02-430. Office of Research and Standards, 1 Winter Street, Boston, MA. April 2002.

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U.S. Environmental Protection Agency. *User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings (Revised)*. Contract No. 68-D70002, Work Assignment No. III-003. Office of Emergency and Remedial Response, Toxics Integration Branch, Washington, D.C. December 2000.

U.S. Environmental Protection Agency. *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)*. Federal Register, November 29, 2002 (Volume 67, Number 230), Pages 71169-71172.

FIGURES

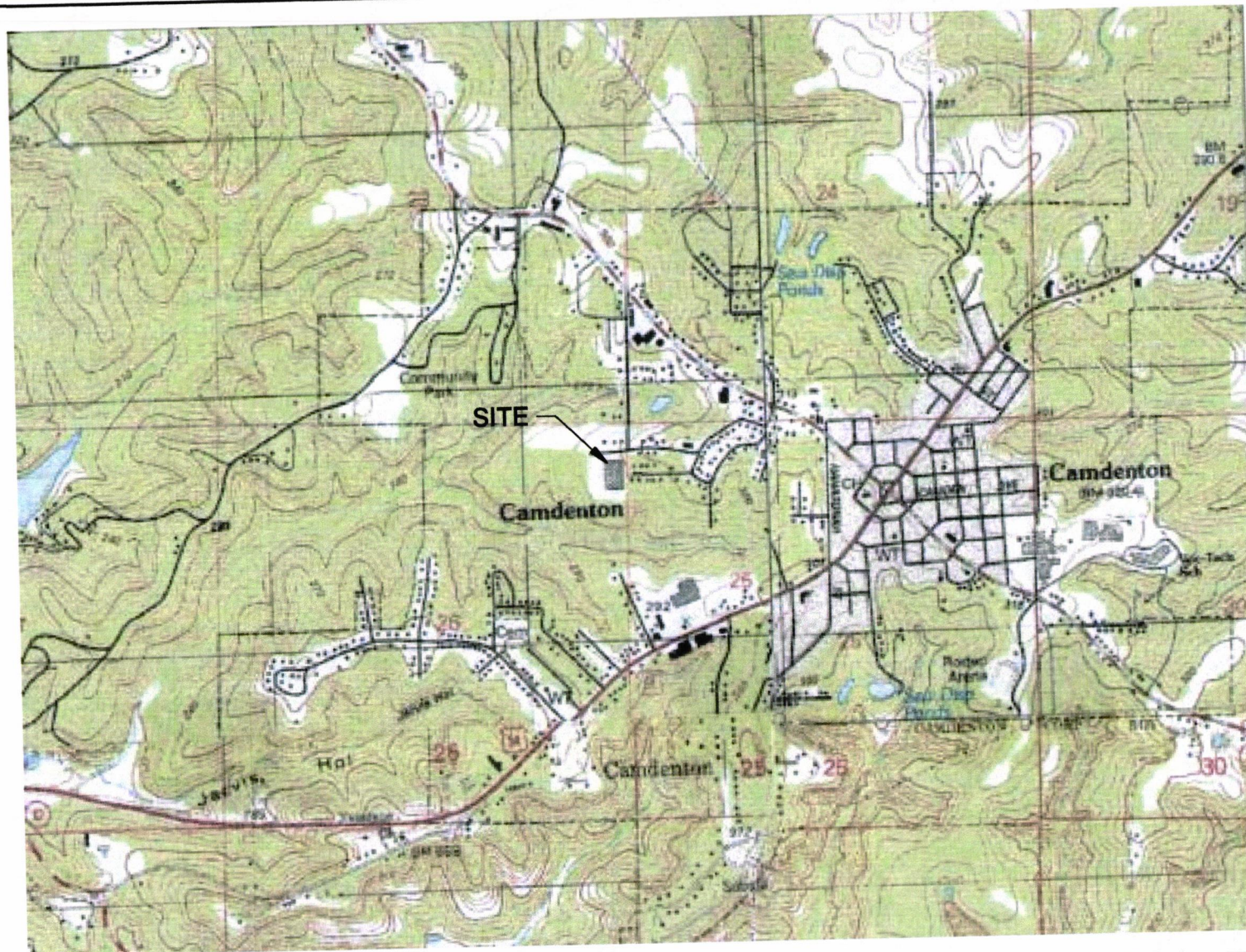


FIGURE 1
SITE LOCATION MAP
MODINE MANUFACTURING COMPANY
CAMDENTON, MISSOURI
JULY, 2002
CH2MHILL



- LEGEND**
- HISTORICAL MONORAIL DEGREASER LOCATION
 - OVEN
 - MD-AS-02 ■ AIR SAMPLING CANISTER LOCATION
 - C-1 ⊕ NIOSH METHOD AIR SAMPLING LOCATION

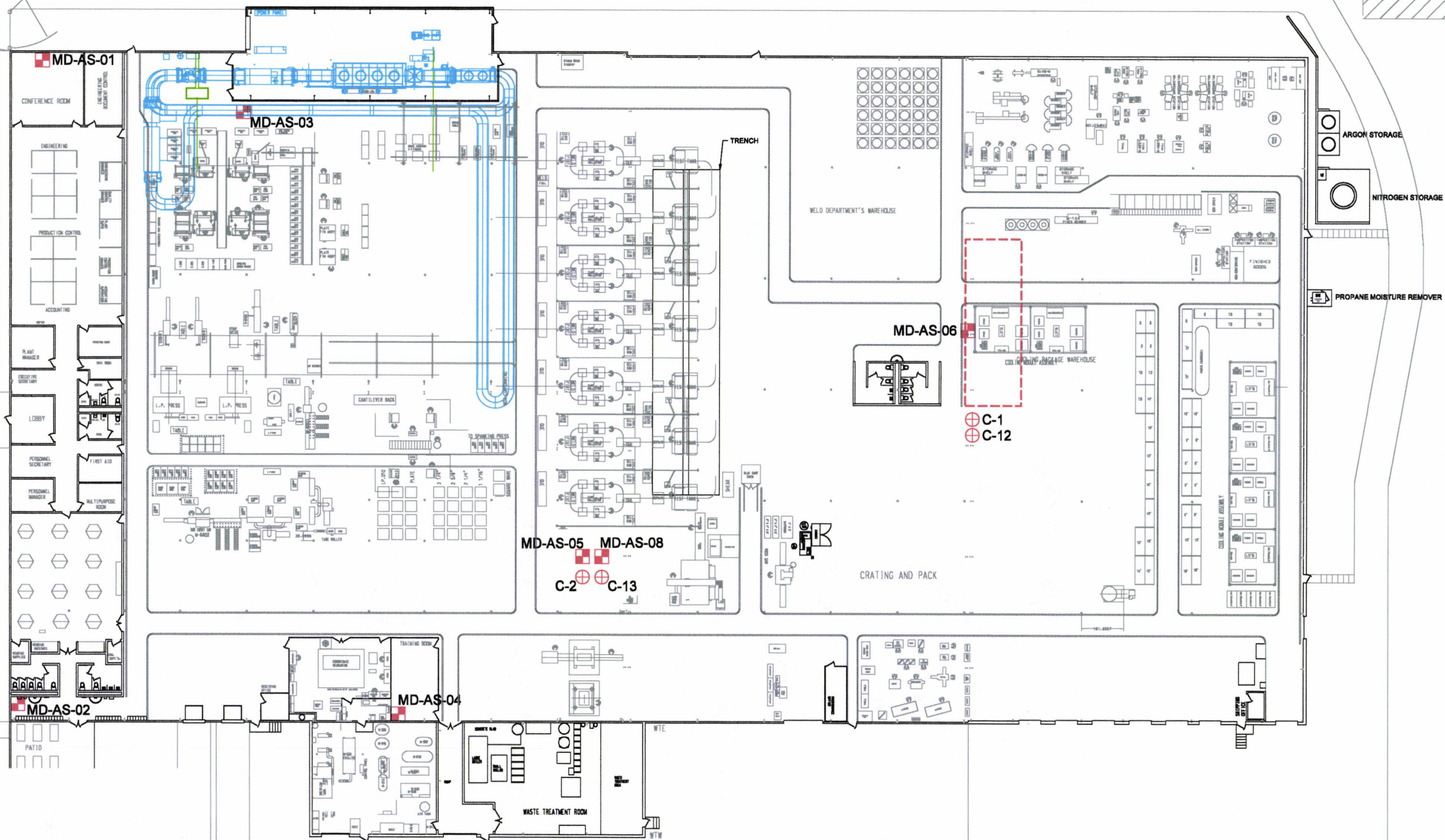


FIGURE 2
INDOOR AIR SAMPLING LOCATIONS
MODINE MANUFACTURING COMPANY
CAMDENTON, MISSOURI
APRIL 2003

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TO-14/15 (canister) Integrated Ambient Air Sampling Method

1 Scope and Application

- 1.1 This sampling method describes the procedure for collecting ambient air samples for volatile organic compounds.

2 Summary of Method

- 2.1 A sample of ambient air is withdrawn from the sample location into a precleaned and evacuated canister by virtue of a flow controller. Sample collection can be integrated over time by adjusting the flow controller. Sample periods as short as 10 minutes to as long as 24 hours can be achieved based on the size of canister used and the sampling rate selected.

3 Apparatus and Materials

- 3.1 Canister, summa polished, precleaned, and evacuated
- 3.2 Flow controller, precleaned, and set at desired sampling rate
- 3.3 Shipping container, suitable for protection and canister during shipping.
- 3.4 Wrenches and screw driver, various sizes as needed for connecting fittings and making adjustment to the flow controller
- 3.5 Bubble flow meter or equivalent, used in the adjustment of the flow controller
- 3.6 Negative Pressure Gauge, either installed on the canister or used externally to check canister pressure.

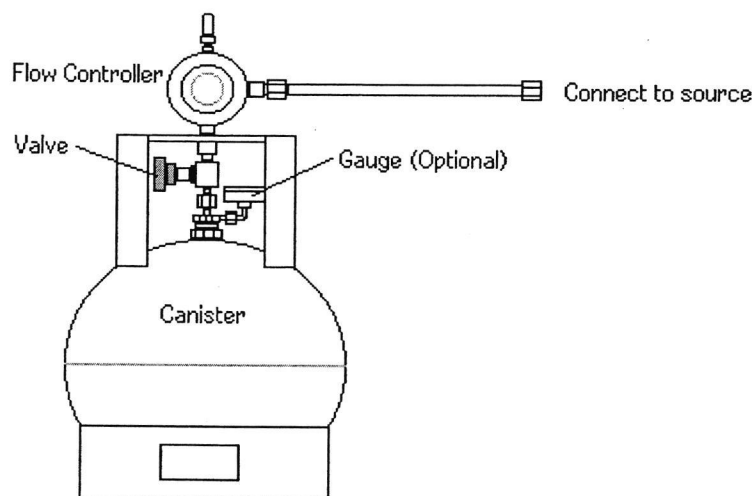
4 Procedure

- 4.1 Inspect the canister for damage. Do not use a canister that has visible damage. Verify that the vacuum pressure of the canister is equal to that indicated on the laboratory's evacuation tag. Do not use a canister that has leaked.
- 4.2 Verify that the flow controller is set at the desired sampling rate. If not pre-set, see the appropriate SOP for flow controller adjustment.
- 4.3 Remove the protective cap from the valve on the canister.
- 4.4 If using an external gauge, attach the gauge to the canister and open the valve. After taking the reading, close the canister and remove the gauge.
- 4.5 In the field log record the canister ID, initial vacuum, desired flowrate, and all sample location information.
- 4.6 Connect the flow controller to the canister. The flow controller fitting denoted "LP" or "OUT" is connected to the canister. Tighten the fitting as to leak free but do not over tighten.
- 4.7 To begin sampling, slowly open the canister valve at least one full turn or more.
- 4.8 For canisters with built in pressure gauges, monitor the vacuum pressure change several times during the course of the selected sample period to ensure the canister is being filled.
- 4.9 At the end of the sample period, close the canister valve finger tight.
- 4.10 Remove the flow controller and replace the protective cap on the canister valve fitting.
- 4.11 If using an external gauge, re-attach it, open the valve, and record the pressure. Then close the valve, remove the gauge, and replace the protective cap.
- 4.12 If the flow controller is going to be used for more than one sample collection, be sure to purge it between uses. To do this, attach the flow controller to a vacuum source and draw clean air or sample gas through it for several minutes before attaching it to the canister.
- 4.13 Fill out all appropriate documentation (chain of custody, sample tags) and return canisters and all equipment to the laboratory in the shipping containers provided.
- 4.14 When packing the canisters for shipment, verify that the valve caps are snug (1/4 turn past finger tight), and use sufficient packing to prevent the valves from rubbing against any hard surfaces.
- 4.15 **Please do not place sticky labels or tape on any surface of the canister!**

5 Quality Control

- 5.1 Canister supplied by the laboratory must follow the performance criteria and quality assurance prescribe in US EPA Method TO-14 for canister cleaning, certification of cleanliness, and leak checking. Standard operating procedures are required.
- 5.2 Flow controllers supplied by the laboratory must follow the performance criteria and quality assurance prescribed in US EPA Method TO-14 for flow controller cleaning and adjustment. Standard operating procedures are required.

FIGURE 1
Assembled Canister Sampler for Integrated Sample Collection



Return to:
CH2M HILL

Applied Sciences Laboratory—Sample Receiving
2300 NW Walnut Boulevard
Corvallis, OR 97330-3538

If you have any questions, please call Customer Services at (541) 758-0235, ext. 3120.

**SAMPLING EQUIPMENT
CERTIFICATION**

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 502

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT17Analysis Mode: SIMLab File ID: CERT17.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/14/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|---|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 529

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT9Analysis Mode: SIMLab File ID: CERT9.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 02/15/03Dilution Factor: 0.25

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|------|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

9
VOLATILE ORGANICS CANISTER CERTIFICATION

LAB CANISTER ID

CAN 544

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT4

Analysis Mode: SIM

Lab File ID: CERT4.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 02/15/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|------|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 546

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT16Analysis Mode: SIMLab File ID: CERT16.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/13/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|---|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 558

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT3Analysis Mode: SIMLab File ID: CERT3.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/12/03Dilution Factor: 0.25

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|------|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 571

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT2Analysis Mode: SIMLab File ID: CERT2.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/13/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|---|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 584

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT18

Analysis Mode: SIM

Lab File ID: CERT18.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/14/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|---|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 607

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT3Analysis Mode: SIMLab File ID: CERT3.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 02/27/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|---|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

CAN 655

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) Air Lab Canister ID CERT19Analysis Mode: SIM Lab File ID: CERT19.DGC Column: DB-VRX ID: 0.25 (mm) Blank Gas: NitrogenDate Certified: 03/14/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|---|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 182

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT9Analysis Mode: SIMLab File ID: CERT9.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/13/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|---|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 222

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT2Analysis Mode: SIMLab File ID: CERT2.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/14/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|---|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 231

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT14

Analysis Mode: SIM

Lab File ID: CERT14.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/13/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|---|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 235

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT13

Analysis Mode: SIM

Lab File ID: CERT13.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/13/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|------|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

9
VOLATILE ORGANICS CANISTER CERTIFICATION

LAB CANISTER ID

FC 238

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT15

Analysis Mode: SIM

Lab File ID: CERT15.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/13/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|---|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 253

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT7Analysis Mode: SIMLab File ID: CERT7.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/13/03Dilution Factor: 0.25

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|------|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

9
VOLATILE ORGANICS CANISTER CERTIFICATION

LAB CANISTER ID

FC 254

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Canister ID CERT10

Analysis Mode: SIM

Lab File ID: CERT10.D

GC Column: DB-VRX ID: 0.25 (mm)

Blank Gas: Nitrogen

Date Certified: 03/13/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|------|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

VOLATILE ORGANICS CANISTER CERTIFICATION

FC 255

Lab Name: CH2M HILL ASL Contract: 179143.AS.01Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040Matrix: (air/soil/water) AirLab Canister ID CERT8Analysis Mode: SIMLab File ID: CERT8.DGC Column: DB-VRX ID: 0.25 (mm)Blank Gas: NitrogenDate Certified: 03/13/03Dilution Factor: 0.25

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|---|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

CH2MHill Applied Sciences Lab
 CHAIN OF CUSTODY RECORD
 AND AGREEMENT TO PERFORM SERVICES

CVO 2300 NW Walnut Boulevard
 Corvallis, OR 97330-3538
 (541) 752-4271 FAX (541) 752-0276

COC # _____

| Project # 179143 | | Purchase Order # | | Requested Analytical Method # | | | | | | | | | | THIS AREA FOR LAB USE ONLY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---------|---|------|-------------------------------|------|------|-----|-------|--|----------|--------|------------------------------------|--------|--|------------------------------------|--------|--|--|--|--|--|--|--|-----------------------|------------------|----------------|------|-----|-------|--|---------|-------|---|--|--|--|---|--|--|----------|--|--|---------|-------|---|--|--|--|---|--|--|----------|--|--|--|-------|---|--|--|--|---|--|--|----------|--|--|--|-------|---|--|--|--|---|--|--|----------|--|--|--|-------|---|--|--|--|---|--|--|----------|--|--|--|-------|---|--|--|--|---|--|--|----------|--|--|--|-------|---|--|--|--|---|--|--|----------|--|--|--|-------|---|--|--|--|---|--|--|----------|--|--|--|-------|---|--|--|
| Project Name Modine | | Company Name CH2M Hill - St. Louis | | | | | | | | | | | | <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">TOTAL # OF CONTAINERS</div> <div style="border: 1px solid black; padding: 5px;"> TO-14 Scan *SIM </div> </div> | | | | | | | | | | Lab # 91040 | Page 1 | of 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Report to: Dan Price | | Phone No: 314-421-0900 | | Preservative | | | | | | | | | | | | | | | | | | | | EPA Tier QC Level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Requested Completion Date: Standard TAT | | Sample Disposal: Dispose <input checked="" type="checkbox"/> Return <input type="checkbox"/> | | | | | | | | | | | | <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; margin-right: 5px;">TOTAL # OF CONTAINERS</div> <div style="border: 1px solid black; padding: 5px;"> TO-14 Scan *SIM </div> </div> | | | | | | | | | | 1 (Screening) 2 3 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Sampling</th> <th rowspan="2">Date</th> <th rowspan="2">Time</th> <th colspan="6">Type</th> <th rowspan="2">Matrix</th> <th rowspan="2">CLIENT SAMPLE ID (8 CHARACTERS)</th> <th rowspan="2">LAB QC</th> </tr> <tr> <th>COMP</th> <th>GRAB</th> <th>WATER</th> <th>SOIL</th> <th>AIR</th> <th>Other</th> </tr> </thead> <tbody> <tr> <td></td> <td>3/19/20</td> <td>10:33</td> <td>X</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td>MD-AS-01</td> <td></td> </tr> <tr> <td></td> <td>3/19/20</td> <td>10:38</td> <td>X</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td>MD-AS-02</td> <td></td> </tr> <tr> <td></td> <td></td> <td>10:52</td> <td>X</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td>MD-AS-03</td> <td></td> </tr> <tr> <td></td> <td></td> <td>10:54</td> <td>X</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td>MD-AS-04</td> <td></td> </tr> <tr> <td></td> <td></td> <td>11:07</td> <td>X</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td>MD-AS-05</td> <td></td> </tr> <tr> <td></td> <td></td> <td>11:07</td> <td>X</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td>MD-AS-06</td> <td></td> </tr> <tr> <td></td> <td></td> <td>11:37</td> <td>X</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td>MD-AS-07</td> <td></td> </tr> <tr> <td></td> <td></td> <td>11:07</td> <td>X</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td>MD-AS-08</td> <td></td> </tr> <tr> <td></td> <td></td> <td>11:45</td> <td>X</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td>MD-AS-B1</td> <td></td> </tr> </tbody> </table> | | Sampling | Date | Time | Type | | | | | | Matrix | CLIENT SAMPLE ID (8 CHARACTERS) | LAB QC | | | | | | | | | | | COMP | GRAB | WATER | SOIL | AIR | Other | | 3/19/20 | 10:33 | X | | | | X | | | MD-AS-01 | | | 3/19/20 | 10:38 | X | | | | X | | | MD-AS-02 | | | | 10:52 | X | | | | X | | | MD-AS-03 | | | | 10:54 | X | | | | X | | | MD-AS-04 | | | | 11:07 | X | | | | X | | | MD-AS-05 | | | | 11:07 | X | | | | X | | | MD-AS-06 | | | | 11:37 | X | | | | X | | | MD-AS-07 | | | | 11:07 | X | | | | X | | | MD-AS-08 | | | | 11:45 | X | | |
| Sampling | Date | | | | Time | Type | | | | | | | | Matrix | CLIENT SAMPLE ID (8 CHARACTERS) | LAB QC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | COMP | GRAB | WATER | | SOIL | AIR | Other | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3/19/20 | 10:33 | X | | | | X | | | MD-AS-01 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3/19/20 | 10:38 | X | | | | X | | | MD-AS-02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 10:52 | X | | | | X | | | MD-AS-03 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 10:54 | X | | | | X | | | MD-AS-04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 11:07 | X | | | | X | | | MD-AS-05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 11:07 | X | | | | X | | | MD-AS-06 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 11:37 | X | | | | X | | | MD-AS-07 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 11:07 | X | | | | X | | | MD-AS-08 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 11:45 | X | | | | X | | | MD-AS-B1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | | | |
|--|--|-----------------------------------|---------------------------------|--|------------|
| Relinquished By Dan Price | | Date/Time 3/20/20 12:05 | Received By | | Date/Time |
| Sampled By and Title Dan Price | | Date/Time | Relinquished By | | Date/Time |
| Received By Carrie Steen | | Date/Time 3/21/20 11:30 | Relinquished By | | Date/Time |
| Received By | | Date/Time | Shipped Via UPS Fed-Ex Other | | Shipping # |

Special Instructions:
*** SIM for TCE, PCE, & vinyl chloride if Scan concentrations are below RL of 1 ppb/v**



CH2MHILL
Applied Sciences Group

Sample Receipt Record

Batch Number: 9040

Date/Time Received: 3/21/03

Client/Project MADINE

Temperature: N/A

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

| Observation | YES | NO | *HD |
|---|-------------------------------------|-------------------------------------|-----|
| Were custody seals intact and on the outside of the cooler? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Was the Chain of Custody inside the cooler? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Was the Chain of Custody properly filled out? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| Were the sample containers in good condition? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| Was there ice in the cooler? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |

If the answer to any of the questions above is NO, a Sample Receipt Exceptions Report Must be written.

VERIFICATION OF SAMPLE PRESERVATION (verify all preserved samples except HAAs, HANs and CH)

| Sample No | Nutrients pH <2 | Metals pH <2 | Volatiles pH <2 | Cyanides pH >12 | TOC pH <2 | Phenol pH <2, FAS | Other (specify) | N/A (soils/unpres) |
|-----------|-----------------|--------------|-----------------|-----------------|-----------|-------------------|-------------------------------------|--------------------|
| 1 | | | | | | | <input checked="" type="checkbox"/> | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| 21 | | | | | | | | |
| 22 | | | | | | | | |
| 23 | | | | | | | | |
| 24 | | | | | | | | |
| 25 | | | | | | | | |
| 26 | | | | | | | | |
| 27 | | | | | | | | |
| 28 | | | | | | | | |
| 29 | | | | | | | | |
| 30 | | | | | | | | |

LOGIN AND pH VERIFICATIONS PERFORMED BY

Comesley 3/21/03/130

Date/Time

Date/Time



CH2M HILL
Applied Sciences Group
2300 NW Walnut Blvd
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

April 10, 2003

Modine

179143.AS.01

RE: Laboratory Report for Modine
Applied Sciences Group Reference No. 9040

Dan Price/STL:

On March 21, 2003, CH2M HILL Applied Sciences Group received nine samples with a request for analysis of selected parameters. All analyses were performed by CH2M HILL unless otherwise indicated below.

The analytical results and associated quality control data are enclosed. Any unusual difficulties encountered during the analysis of your samples are discussed in the case narrative. This data package meets standards requested by client and is not intended or implied to meet any other standard.

CH2M HILL Applied Sciences Group appreciates your business and looks forward to serving your analytical needs again. If you should have any questions concerning the data, or if you need additional information, please call Ben Thompson at (541) 758-0235, extension 3132.

Sincerely,

A handwritten signature in black ink that reads "Ben Thompson". The signature is fluid and cursive, with the first and last names clearly legible.

Ben Thompson
Analytical Manager

Enclosures

TO-14A

CASE NARRATIVE
VOLATILE ORGANIC ANALYSIS

CLIENT/PROJECT: Modine

ANALYTICAL METHOD: TO-14A

LABORATORY: CH2M HILL Applied Sciences Lab

PROJECT NO.: 179143.AS.01

LAB CODE: CVO

LAB BATCH NO.: 9040

I. RECEIPT

A. Date: March 21, 2003

B. Sample Information

| LAB SAMPLE ID | CLIENT SAMPLE ID | CANISTER ID | SAMPLE MATRIX | DATE SAMPLED | TIME SAMPLED | RECEIVED PRESS. (torr) |
|------------------|---------------------|----------------|------------------|-----------------|-----------------|---------------------------|
| 904001 | MD-AS-01 | 529 | Air | 03/19/2003 | 10:33 | 729 |
| 904002 | MD-AS-02 | 655 | Air | 03/19/2003 | 10:38 | 703 |
| 904003 | MD-AS-03 | 558 | Air | 03/19/2003 | 10:52 | 282 |
| 904004 | MD-AS-04 | 607 | Air | 03/19/2003 | 10:54 | 598 |
| 904005 | MD-AS-05 | 584 | Air | 03/19/2003 | 11:07 | 515 |
| 904006 | MD-AS-06 | 571 | Air | 03/19/2003 | 11:22 | 717 |
| 904007 | MD-AS-07 | 544 | Air | 03/19/2003 | 11:37 | 756 |
| 904008 | MD-AS-08 | 502 | Air | 03/19/2003 | 11:07 | 382 |
| 904009 | MD-AS-B1 | 546 | Air | 03/19/2003 | 11:45 | 0 |

II. Holding Times:
All acceptance criteria were met.

III. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Duplicate Sample(s):
All acceptance criteria were met.

D. Instrument Performance Check:
All acceptance criteria were met.

E. Surrogate Recoveries:
All acceptance criteria were met.

F. Internal Standards:
All acceptance criteria were met.

G. Laboratory Control Sample (LCS)
All acceptance criteria were met.

H. Matrix Spike(MS)/Matrix Spike Duplicate(MSD)
Not applicable.

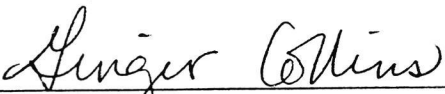
I. Analytical Exception:
None.

J. Other:
None

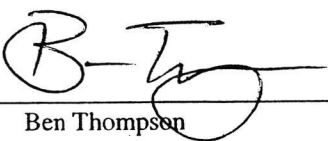
IV. Sampling Equipment Exceptions:
None.

V. Documentation Exceptions:
None.

VI. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

SIGNED: 
Ginger Collins
Analytical Chemist

DATE: 4/8/03

REVIEWED: 
Ben Thompson
Organics Supervisor

DATE: 4/9/03

**SAMPLE DATA
SUMMARY**

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-01

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904001

Level: (low/med) LOW Lab File ID: 904001.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/25/03

Dilution Factor: 1

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPBV | Q |
|----------|------------------------|------|---|
| 75-01-4 | Vinyl chloride | 1.0 | U |
| 75-35-4 | 1,1-Dichloroethene | 1.0 | U |
| 75-09-2 | Methylene chloride | 1.1 | |
| 75-34-3 | 1,1-Dichloroethane | 1.0 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 1.0 | U |
| 71-55-6 | 1,1,1-Trichloroethane | 1.0 | U |
| 79-01-6 | Trichloroethene | 14.6 | |
| 127-18-4 | Tetrachloroethene | 1.0 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-02

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904002

Level: (low/med) LOW Lab File ID: 904002.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/25/03

Dilution Factor: 1

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPBV | Q |
|----------|------------------------|------|---|
| 75-01-4 | Vinyl chloride | 1.0 | U |
| 75-35-4 | 1,1-Dichloroethene | 1.0 | U |
| 75-09-2 | Methylene chloride | 0.6 | J |
| 75-34-3 | 1,1-Dichloroethane | 1.0 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 0.9 | J |
| 71-55-6 | 1,1,1-Trichloroethane | 1.0 | U |
| 79-01-6 | Trichloroethene | 61.5 | |
| 127-18-4 | Tetrachloroethene | 1.0 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-03

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904003

Level: (low/med) LOW Lab File ID: 904003R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 5

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPBV | Q |
|----------|------------------------|------|---|
| 75-01-4 | Vinyl chloride | 4.5 | U |
| 75-35-4 | 1,1-Dichloroethene | 4.5 | U |
| 75-09-2 | Methylene chloride | 4.5 | U |
| 75-34-3 | 1,1-Dichloroethane | 4.5 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 4.5 | U |
| 71-55-6 | 1,1,1-Trichloroethane | 4.5 | U |
| 79-01-6 | Trichloroethene | 46.7 | |
| 127-18-4 | Tetrachloroethene | 4.5 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-04

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904004

Level: (low/med) LOW Lab File ID: 904004R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 2

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPBV | Q |
|----------|------------------------|------|---|
| 75-01-4 | Vinyl chloride | 2.0 | U |
| 75-35-4 | 1,1-Dichloroethene | 2.0 | U |
| 75-09-2 | Methylene chloride | 2.0 | U |
| 75-34-3 | 1,1-Dichloroethane | 2.0 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 2.0 | U |
| 71-55-6 | 1,1,1-Trichloroethane | 2.0 | U |
| 79-01-6 | Trichloroethene | 56.5 | |
| 127-18-4 | Tetrachloroethene | 2.0 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-05

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904005

Level: (low/med) LOW Lab File ID: 904005R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 2

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

| | | | |
|----------|------------------------|------|---|
| 75-01-4 | Vinyl chloride | 2.3 | U |
| 75-35-4 | 1,1-Dichloroethene | 2.3 | U |
| 75-09-2 | Methylene chloride | 2.3 | U |
| 75-34-3 | 1,1-Dichloroethane | 2.3 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 2.3 | U |
| 71-55-6 | 1,1,1-Trichloroethane | 2.3 | U |
| 79-01-6 | Trichloroethene | 42.2 | |
| 127-18-4 | Tetrachloroethene | 2.3 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-05DUP

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904005D

Level: (low/med) LOW Lab File ID: 904005D.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 2

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPBV | Q |
|----------|------------------------|------|---|
| 75-01-4 | Vinyl chloride | 2.3 | U |
| 75-35-4 | 1,1-Dichloroethene | 2.3 | U |
| 75-09-2 | Methylene chloride | 2.3 | U |
| 75-34-3 | 1,1-Dichloroethane | 2.3 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 2.3 | U |
| 71-55-6 | 1,1,1-Trichloroethane | 2.3 | U |
| 79-01-6 | Trichloroethene | 43.4 | |
| 127-18-4 | Tetrachloroethene | 2.3 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-06

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904006

Level: (low/med) LOW Lab File ID: 904006.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/25/03

Dilution Factor: 1

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPBV | Q |
|----------|------------------------|------|---|
| 75-01-4 | Vinyl chloride | 1.0 | U |
| 75-35-4 | 1,1-Dichloroethene | 1.0 | U |
| 75-09-2 | Methylene chloride | 0.8 | J |
| 75-34-3 | 1,1-Dichloroethane | 1.0 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 0.6 | J |
| 71-55-6 | 1,1,1-Trichloroethane | 1.0 | U |
| 79-01-6 | Trichloroethene | 34.6 | |
| 127-18-4 | Tetrachloroethene | 1.0 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-07

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904007

Level: (low/med) LOW Lab File ID: 904007.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/25/03

Dilution Factor: 1

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPBV | Q |
|----------|------------------------|------|---|
| 75-01-4 | Vinyl chloride | 1.0 | U |
| 75-35-4 | 1,1-Dichloroethene | 1.0 | U |
| 75-09-2 | Methylene chloride | 1.0 | U |
| 75-34-3 | 1,1-Dichloroethane | 1.0 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 1.0 | U |
| 71-55-6 | 1,1,1-Trichloroethane | 1.0 | U |
| 79-01-6 | Trichloroethene | 1.0 | U |
| 127-18-4 | Tetrachloroethene | 1.0 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-08

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904008

Level: (low/med) LOW Lab File ID: 904008R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 3

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPBV | Q |
|----------|------------------------|------|---|
| 75-01-4 | Vinyl chloride | 2.9 | U |
| 75-35-4 | 1,1-Dichloroethene | 2.9 | U |
| 75-09-2 | Methylene chloride | 2.9 | U |
| 75-34-3 | 1,1-Dichloroethane | 2.9 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 2.9 | U |
| 71-55-6 | 1,1,1-Trichloroethane | 2.9 | U |
| 79-01-6 | Trichloroethene | 42.7 | |
| 127-18-4 | Tetrachloroethene | 2.9 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-B1

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904009

Level: (low/med) LOW

Lab File ID: 904009R.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/29/03

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

| | | | |
|----------|------------------------|-----|---|
| 75-01-4 | Vinyl chloride | 1.0 | U |
| 75-35-4 | 1,1-Dichloroethene | 1.0 | U |
| 75-09-2 | Methylene chloride | 1.0 | U |
| 75-34-3 | 1,1-Dichloroethane | 1.0 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 1.0 | U |
| 71-55-6 | 1,1,1-Trichloroethane | 1.0 | U |
| 79-01-6 | Trichloroethene | 1.0 | U |
| 127-18-4 | Tetrachloroethene | 1.0 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B1_0324

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: B1_0324

Level: (low/med) LOW

Lab File ID: B1_0324.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: NA

Date Analyzed: 03/24/03

Dilution Factor: 1

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPBV | Q |
|----------|------------------------|------|---|
| 75-01-4 | Vinyl chloride | 1.0 | U |
| 75-35-4 | 1,1-Dichloroethene | 1.0 | U |
| 75-09-2 | Methylene chloride | 0.9 | J |
| 75-34-3 | 1,1-Dichloroethane | 1.0 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 1.0 | U |
| 71-55-6 | 1,1,1-Trichloroethane | 1.0 | U |
| 79-01-6 | Trichloroethene | 1.0 | U |
| 127-18-4 | Tetrachloroethene | 1.0 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

XB1_0325

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: XB1_0325

Level: (low/med) LOW Lab File ID: XB1_0325.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/25/03

Dilution Factor: 1

CONCENTRATION UNITS:

CAS NO. COMPOUND PPBV Q

| | | | |
|----------|------------------------|-----|---|
| 75-01-4 | Vinyl chloride | 1.0 | U |
| 75-35-4 | 1,1-Dichloroethene | 1.0 | U |
| 75-09-2 | Methylene chloride | 0.6 | J |
| 75-34-3 | 1,1-Dichloroethane | 1.0 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 1.0 | U |
| 71-55-6 | 1,1,1-Trichloroethane | 1.0 | U |
| 79-01-6 | Trichloroethene | 1.0 | U |
| 127-18-4 | Tetrachloroethene | 1.0 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

XB2_0328

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: XB2_0328

Level: (low/med) LOW

Lab File ID: XB2_0328.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 1

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPBV | Q |
|----------|------------------------|------|---|
| 75-01-4 | Vinyl chloride | 1.0 | U |
| 75-35-4 | 1,1-Dichloroethene | 1.0 | U |
| 75-09-2 | Methylene chloride | 0.9 | J |
| 75-34-3 | 1,1-Dichloroethane | 1.0 | U |
| 156-59-2 | cis-1,2-Dichloroethene | 1.0 | U |
| 71-55-6 | 1,1,1-Trichloroethane | 1.0 | U |
| 79-01-6 | Trichloroethene | 1.0 | U |
| 127-18-4 | Tetrachloroethene | 1.0 | U |

QC SUMMARY

2A
VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040

| | EPA SAMPLE NO. | SMC1 # | SMC2 # | TOT OUT |
|----|-------------------|-----------|-----------|------------|
| 01 | B1_0324 | 98 | 91 | 0 |
| 02 | XB1_0325 | 98 | 94 | 0 |
| 03 | MD-AS-01 | 100 | 96 | 0 |
| 04 | MD-AS-02 | 97 | 94 | 0 |
| 05 | MD-AS-06 | 99 | 95 | 0 |
| 06 | MD-AS-07 | 98 | 92 | 0 |
| 07 | XB2_0328 | 91 | 86 | 0 |
| 08 | MD-AS-B1 | 98 | 89 | 0 |
| 09 | MD-AS-03 | 101 | 92 | 0 |
| 10 | MD-AS-04 | 99 | 88 | 0 |
| 11 | MD-AS-05 | 100 | 93 | 0 |
| 12 | MD-AS-05DUP | 100 | 92 | 0 |
| 13 | MD-AS-08 | 102 | 90 | 0 |

SMC1 = Toluene-d8
SMC2 = Bromofluorobenzene

QC LIMITS
(70-130)
(70-130)

Column to be used to flag recovery values
* Values outside of contract required QC limits
D System Monitoring Compound diluted out

3
DUPLICATES
VOLATILE ORGANIC ANALYSIS

Lab Name: Applied Sciences Laboratory
Lab Code: CVO
Lab File ID: C:\HPCHEM\1\DATA\032803G1\904005R.D
Lab File ID: C:\HPCHEM\1\DATA\032803G1\904005D.D
Instrument ID: GODZILLA
GC Column: DB-VRX 0.25mm x 60 meters

Project No.: 179143.AS.01
Lab Batch No.: 9040
Lab Sample ID: 904005
Date Analyzed: 03/29/03
Concentration Units: ppbv

| ANALYTE | CONTROL LIMIT | SAMPLE | DUPLICATE | RPD (%) |
|------------------------|------------------|--------|-----------|------------|
| Vinyl chloride | ± 30 | 2.3 U | 2.3 U | -- |
| 1,1-Dichloroethene | ± 30 | 2.3 U | 2.3 U | -- |
| Methylene chloride | ± 30 | 2.3 U | 2.3 U | -- |
| 1,1-Dichloroethane | ± 30 | 2.3 U | 2.3 U | -- |
| cis-1,2-Dichloroethene | ± 30 | 2.3 U | 2.3 U | -- |
| 1,1,1-Trichloroethane | ± 30 | 2.3 U | 2.3 U | -- |
| Trichloroethene | ± 30 | 42.2 | 43.4 | 2.8 |
| Tetrachloroethene | ± 30 | 2.3 U | 2.3 U | -- |

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

B1_0324

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
Lab File ID: B1_0324.D Lab Sample ID: B1_0324
Date Analyzed: 03/24/03 Time Analyzed: 12:51
GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N
Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

| | EPA SAMPLE NO. | LAB SAMPLE ID | LAB FILE ID | TIME ANALYZED |
|----|-------------------|------------------|----------------|------------------|
| 01 | 1 PPBV STD | LEVEL1 | LEVEL1.D | 13:33 |
| 02 | 5 PPBV STD | LEVEL2 | LEVEL2.D | 14:37 |
| 03 | 10 PPBV STD | LEVEL3 | LEVEL3.D | 15:16 |
| 04 | 20 PPBV STD | LEVEL4 | LEVEL4.D | 15:57 |
| 05 | 50 PPBV STD | LEVEL5 | LEVEL5.D | 16:36 |
| 06 | 100 PPBV STD | LEVEL6 | LEVEL6.D | 17:15 |

COMMENTS:

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

XB1_0325

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
Lab File ID: XB1_0325.D Lab Sample ID: XB1_0325
Date Analyzed: 03/25/03 Time Analyzed: 11:12
GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N
Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

| | EPA SAMPLE NO. | LAB SAMPLE ID | LAB FILE ID | TIME ANALYZED |
|----|-------------------|------------------|----------------|------------------|
| 01 | CV2_0325 | CV2_0325 | CV2_0325.D | 09:02 |
| 02 | MD-AS-01 | 904001 | 904001.D | 19:51 |
| 03 | MD-AS-02 | 904002 | 904002.D | 20:47 |
| 04 | MD-AS-06 | 904006 | 904006.D | 21:42 |
| 05 | MD-AS-07 | 904007 | 904007.D | 22:35 |

COMMENTS:

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

XB2_0328

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
Lab File ID: XB2_0328.D Lab Sample ID: XB2_0328
Date Analyzed: 03/28/03 Time Analyzed: 09:33
GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N
Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

| | EPA SAMPLE NO. | LAB SAMPLE ID | LAB FILE ID | TIME ANALYZED |
|----|-------------------|------------------|----------------|------------------|
| 01 | CV3_0328 | CV3_0328 | CV3_0328.D | 15:54 |
| 02 | MD-AS-B1 | 904009 | 904009R.D | 04:09 |
| 03 | MD-AS-03 | 904003 | 904003R.D | 04:54 |
| 04 | MD-AS-04 | 904004 | 904004R.D | 05:39 |
| 05 | MD-AS-05 | 904005 | 904005R.D | 06:24 |
| 06 | MD-AS-05DUP | 904005D | 904005D.D | 07:10 |
| 07 | MD-AS-08 | 904008 | 904008R.D | 07:57 |

COMMENTS:

5A
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Lab File ID: T1_0324.D BFB Injection Date: 03/24/03
 Instrument ID: GC/MS - G BFB Injection Time: 12:51
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

| m/e | ION ABUNDANCE CRITERIA | % RELATIVE ABUNDANCE |
|-----|------------------------------------|----------------------|
| 50 | 15.0 - 40.0% of mass 95 | 17.1 |
| 75 | 30.0 - 60.0% of mass 95 | 41.1 |
| 95 | Base peak, 100% relative abundance | 100.0 |
| 96 | 5.0 - 9.0% of mass 95 | 7.6 |
| 173 | Less than 2.0% of mass 174 | 0.0 |
| 174 | 50.0 - 100.0% of mass 95 | 86.4 |
| 175 | 5.0 - 9.0% of mass 174 | 7.9 |
| 176 | 95.0 - 101.0% of mass 174 | 98.1 |
| 177 | 5.0 - 9.0% of mass 176 | 5.7 |

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

| | EPA SAMPLE NO. | LAB SAMPLE ID | LAB FILE ID | DATE ANALYZED | TIME ANALYZED |
|----|-------------------|------------------|----------------|------------------|------------------|
| 01 | B1_0324 | B1_0324 | B1_0324.D | 03/24/03 | 12:51 |
| 02 | 1 PPBV STD | LEVEL1 | LEVEL1.D | 03/24/03 | 13:33 |
| 03 | 5 PPBV STD | LEVEL2 | LEVEL2.D | 03/24/03 | 14:37 |
| 04 | 10 PPBV STD | LEVEL3 | LEVEL3.D | 03/24/03 | 15:16 |
| 05 | 20 PPBV STD | LEVEL4 | LEVEL4.D | 03/24/03 | 15:57 |
| 06 | 50 PPBV STD | LEVEL5 | LEVEL5.D | 03/24/03 | 16:36 |
| 07 | 100 PPBV STD | LEVEL6 | LEVEL6.D | 03/24/03 | 17:15 |

5A
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Lab File ID: T2_0325.D BFB Injection Date: 03/25/03
 Instrument ID: GC/MS - G BFB Injection Time: 09:02
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

| m/e | ION ABUNDANCE CRITERIA | % RELATIVE ABUNDANCE |
|-----|------------------------------------|----------------------|
| 50 | 15.0 - 40.0% of mass 95 | 16.8 |
| 75 | 30.0 - 60.0% of mass 95 | 39.8 |
| 95 | Base peak, 100% relative abundance | 100.0 |
| 96 | 5.0 - 9.0% of mass 95 | 8.0 |
| 173 | Less than 2.0% of mass 174 | 0.0 |
| 174 | 50.0 - 100.0% of mass 95 | 85.3 |
| 175 | 5.0 - 9.0% of mass 174 | 7.7 |
| 176 | 95.0 - 101.0% of mass 174 | 95.3 |
| 177 | 5.0 - 9.0% of mass 176 | 6.8 |

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

| | EPA SAMPLE NO. | LAB SAMPLE ID | LAB FILE ID | DATE ANALYZED | TIME ANALYZED |
|----|-------------------|------------------|----------------|------------------|------------------|
| 01 | CV2_0325 | CV2_0325 | CV2_0325.D | 03/25/03 | 09:02 |
| 02 | XB1_0325 | XB1_0325 | XB1_0325.D | 03/25/03 | 11:12 |
| 03 | MD-AS-01 | 904001 | 904001.D | 03/25/03 | 19:51 |
| 04 | MD-AS-02 | 904002 | 904002.D | 03/25/03 | 20:47 |
| 05 | MD-AS-06 | 904006 | 904006.D | 03/25/03 | 21:42 |
| 06 | MD-AS-07 | 904007 | 904007.D | 03/25/03 | 22:35 |

5A
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Lab File ID: T2_0328.D BFB Injection Date: 03/28/03
 Instrument ID: GC/MS - G BFB Injection Time: 09:33
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

| m/e | ION ABUNDANCE CRITERIA | % RELATIVE ABUNDANCE |
|-----|------------------------------------|----------------------|
| 50 | 15.0 - 40.0% of mass 95 | 17.5 |
| 75 | 30.0 - 60.0% of mass 95 | 42.2 |
| 95 | Base peak, 100% relative abundance | 100.0 |
| 96 | 5.0 - 9.0% of mass 95 | 6.7 |
| 173 | Less than 2.0% of mass 174 | 0.0 |
| 174 | 50.0 - 100.0% of mass 95 | 90.1 |
| 175 | 5.0 - 9.0% of mass 174 | 6.5 |
| 176 | 95.0 - 101.0% of mass 174 | 96.6 |
| 177 | 5.0 - 9.0% of mass 176 | 6.8 |

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

| | EPA SAMPLE NO. | LAB SAMPLE ID | LAB FILE ID | DATE ANALYZED | TIME ANALYZED |
|----|-------------------|------------------|----------------|------------------|------------------|
| 01 | XB2_0328 | XB2_0328 | XB2_0328.D | 03/28/03 | 09:33 |
| 02 | CV3_0328 | CV3_0328 | CV3_0328.D | 03/28/03 | 15:54 |
| 03 | MD-AS-B1 | 904009 | 904009R.D | 03/29/03 | 04:09 |
| 04 | MD-AS-03 | 904003 | 904003R.D | 03/29/03 | 04:54 |
| 05 | MD-AS-04 | 904004 | 904004R.D | 03/29/03 | 05:39 |
| 06 | MD-AS-05 | 904005 | 904005R.D | 03/29/03 | 06:24 |
| 07 | MD-AS-05DUP | 904005D | 904005D.D | 03/29/03 | 07:10 |
| 08 | MD-AS-08 | 904008 | 904008R.D | 03/29/03 | 07:57 |

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Instrument ID: GC/MS - G Calibration Date(s): 03/24/03 03/24/03
 Heated Purge (Y/N): N Calibration Times: 13:33 17:15
 GC Column: DB-VRX ID: 0.25 (mm)

LAB FILE ID:

RRF1 = LEVEL1.D RRF2 = LEVEL2.D RRF3 = LEVEL3.D
 RRF4 = LEVEL4.D RRF5 = LEVEL5.D RRF6 = LEVEL6.D

| COMPOUND | RRF1 | RRF2 | RRF3 | RRF4 | RRF5 | RRF6 | RRF | % RSD |
|------------------------|-------|-------|-------|-------|-------|-------|-------|----------|
| Vinyl chloride | 1.089 | 1.027 | 1.226 | 1.376 | 1.275 | 1.176 | 1.195 | 10.6 |
| 1,1-Dichloroethene | 1.964 | 2.121 | 2.227 | 2.490 | 2.246 | 2.048 | 2.183 | 8.5 |
| Methylene chloride | 2.563 | 1.543 | 1.597 | 1.779 | 1.563 | 1.430 | 1.746 | 23.8 |
| 1,1-Dichloroethane | 1.854 | 2.052 | 2.195 | 2.564 | 2.293 | 1.830 | 2.131 | 13.1 |
| cis-1,2-Dichloroethene | 1.362 | 1.541 | 1.661 | 1.934 | 1.752 | 1.450 | 1.617 | 13.0 |
| 1,1,1-Trichloroethane | 1.809 | 2.150 | 2.253 | 2.638 | 2.443 | 2.163 | 2.243 | 12.6 |
| Trichloroethene | 0.358 | 0.421 | 0.440 | 0.502 | 0.434 | 0.390 | 0.424 | 11.5 |
| Tetrachloroethene | 0.170 | 0.187 | 0.203 | 0.223 | 0.186 | 0.158 | 0.188 | 12.4 |
| Toluene-d8 | 0.865 | 0.876 | 0.904 | 0.869 | 0.869 | 0.876 | 0.876 | 1.6 |
| Bromofluorobenzene | 0.159 | 0.166 | 0.166 | 0.168 | 0.178 | 0.206 | 0.174 | 9.7 |

7A
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Instrument ID: GC/MS - G Calibration Date: 03/25/03 Time: 09:02
 Lab File ID: CV2_0325.D Init. Calib. Date(s): 03/24/03 03/24/03
 Heated Purge: (Y/N) N Init. Calib. Times: 13:33 17:15
 GC Column: DB-VRX ID: 0.25 (mm)

| COMPOUND | RRF | RRF4 | | % D | MAX % D |
|------------------------|-------|-------|--|------|------------|
| Vinyl chloride | 1.195 | 1.272 | | -6.5 | 30 |
| 1,1-Dichloroethene | 2.183 | 2.184 | | 0.0 | 30 |
| Methylene chloride | 1.746 | 1.499 | | 14.2 | 30 |
| 1,1-Dichloroethane | 2.131 | 1.987 | | 6.8 | 30 |
| cis-1,2-Dichloroethene | 1.617 | 1.560 | | 3.5 | 30 |
| 1,1,1-Trichloroethane | 2.243 | 2.219 | | 1.1 | 30 |
| Trichloroethene | 0.424 | 0.444 | | -4.6 | 30 |
| Tetrachloroethene | 0.188 | 0.181 | | 3.8 | 30 |
| Toluene-d8 | 0.876 | 0.828 | | 5.6 | 30 |
| Bromofluorobenzene | 0.174 | 0.174 | | -0.3 | 30 |

7A
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Instrument ID: GC/MS - G Calibration Date: 03/28/03 Time: 15:54
 Lab File ID: CV3_0328.D Init. Calib. Date(s): 03/24/03 03/24/03
 Heated Purge: (Y/N) N Init. Calib. Times: 13:33 17:15
 GC Column: DB-VRX ID: 0.25 (mm)

| COMPOUND | RRF | RRF4 | | % D | MAX % D |
|------------------------|-------|-------|--|------|------------|
| Vinyl chloride | 1.195 | 1.175 | | 1.6 | 30 |
| 1,1-Dichloroethene | 2.183 | 2.102 | | 3.7 | 30 |
| Methylene chloride | 1.746 | 1.407 | | 19.4 | 30 |
| 1,1-Dichloroethane | 2.131 | 2.138 | | -0.3 | 30 |
| cis-1,2-Dichloroethene | 1.617 | 1.587 | | 1.8 | 30 |
| 1,1,1-Trichloroethane | 2.243 | 2.199 | | 2.0 | 30 |
| Trichloroethene | 0.424 | 0.437 | | -3.1 | 30 |
| Tetrachloroethene | 0.188 | 0.192 | | -2.4 | 30 |
| Toluene-d8 | 0.876 | 0.862 | | 1.6 | 30 |
| Bromofluorobenzene | 0.174 | 0.164 | | 5.6 | 30 |

8A
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Lab File ID (Standard): CV2_0325.D Date Analyzed: 03/25/03
 Instrument ID: GC/MS - G Time Analyzed: 09:02
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

| | IS1 AREA # | RT # | IS2 AREA # | RT # | IS3 AREA # | RT # |
|-------------------|---------------|-------|---------------|-------|---------------|-------|
| 24 HOUR STD | 67845 | 13.57 | 299605 | 16.04 | 81745 | 20.53 |
| UPPER LIMIT | 94983 | 14.07 | 419447 | 16.54 | 114443 | 21.03 |
| LOWER LIMIT | 40707 | 13.07 | 179763 | 15.54 | 49047 | 20.03 |
| EPA SAMPLE NO. | | | | | | |
| 01 XB1_0325 | 65071 | 13.68 | 284758 | 16.12 | 85229 | 20.58 |
| 02 MD-AS-01 | 59508 | 13.54 | 253930 | 15.99 | 76016 | 20.46 |
| 03 MD-AS-02 | 63951 | 13.58 | 272557 | 16.03 | 84136 | 20.53 |
| 04 MD-AS-06 | 65623 | 13.56 | 285559 | 16.01 | 84903 | 20.49 |
| 05 MD-AS-07 | 68945 | 13.60 | 289347 | 16.02 | 85904 | 20.51 |
| 06 XB2_0328 | 61854 | 13.68 | 270902 | 16.12 | 74558 | 20.58 |

IS1 = Bromochloromethane
 IS2 = 1,4-Difluorobenzene
 IS3 = Chlorobenzene-d5

AREA UPPER LIMIT = +40% of internal standard area
 AREA LOWER LIMIT = - 40% of internal standard area
 RT UPPER LIMIT = +0.50 minutes of internal standard RT
 RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column to be used to flag values outside QC limit with an asterisk.

* Values outside of contract required QC limits

8A
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032403 SDG No.: 9040
 Lab File ID (Standard): CV3_0328.D Date Analyzed: 03/28/03
 Instrument ID: GC/MS - G Time Analyzed: 15:54
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

| | IS1 AREA # | RT # | IS2 AREA # | RT # | IS3 AREA # | RT # |
|-------------------|---------------|-------|---------------|-------|---------------|-------|
| 24 HOUR STD | 63377 | 13.64 | 272250 | 16.07 | 80337 | 20.57 |
| UPPER LIMIT | 88728 | 14.14 | 381150 | 16.57 | 112472 | 21.07 |
| LOWER LIMIT | 38026 | 13.14 | 163350 | 15.57 | 48202 | 20.07 |
| EPA SAMPLE NO. | | | | | | |
| 01 MD-AS-B1 | 63512 | 13.65 | 279211 | 16.08 | 80524 | 20.57 |
| 02 MD-AS-03 | 63489 | 13.65 | 274232 | 16.10 | 82335 | 20.57 |
| 03 MD-AS-04 | 69478 | 13.64 | 302320 | 16.05 | 86286 | 20.51 |
| 04 MD-AS-05 | 66381 | 13.66 | 299688 | 16.11 | 86512 | 20.58 |
| 05 MD-AS-05DUP | 70119 | 13.70 | 300031 | 16.13 | 88280 | 20.58 |
| 06 MD-AS-08 | 70128 | 13.67 | 293934 | 16.07 | 89169 | 20.54 |

IS1 = Bromochloromethane
 IS2 = 1,4-Difluorobenzene
 IS3 = Chlorobenzene-d5

AREA UPPER LIMIT = +40% of internal standard area

AREA LOWER LIMIT = - 40% of internal standard area

RT UPPER LIMIT = +0.50 minutes of internal standard RT

RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column to be used to flag values outside QC limit with an asterisk.

* Values outside of contract required QC limits

TO-14A SIM

CASE NARRATIVE
VOLATILE ORGANIC ANALYSIS

CLIENT/PROJECT: Modine

ANALYTICAL METHOD: TO-14A SIM

LABORATORY: CH2M HILL Applied Sciences Lab

PROJECT NO.: 179143.AS.01

LAB CODE: CVO

LAB BATCH NO.: 9040

I. RECEIPT

A. Date: March 21, 2003

B. Sample Information

| LAB SAMPLE ID | CLIENT SAMPLE ID | CANISTER ID | SAMPLE MATRIX | DATE SAMPLED | TIME SAMPLED | RECEIVED PRESS. (torr) |
|------------------|---------------------|----------------|------------------|-----------------|-----------------|---------------------------|
| 904001 | MD-AS-01 | 529 | Air | 03/19/2003 | 10:33 | 729 |
| 904002 | MD-AS-02 | 655 | Air | 03/19/2003 | 10:38 | 703 |
| 904003 | MD-AS-03 | 558 | Air | 03/19/2003 | 10:52 | 282 |
| 904004 | MD-AS-04 | 607 | Air | 03/19/2003 | 10:54 | 598 |
| 904005 | MD-AS-05 | 584 | Air | 03/19/2003 | 11:07 | 515 |
| 904006 | MD-AS-06 | 571 | Air | 03/19/2003 | 11:22 | 717 |
| 904007 | MD-AS-07 | 544 | Air | 03/19/2003 | 11:37 | 756 |
| 904008 | MD-AS-08 | 502 | Air | 03/19/2003 | 11:07 | 382 |
| 904009 | MD-AS-B1 | 546 | Air | 03/19/2003 | 11:45 | 0 |

II. Holding Times:

All acceptance criteria were met.

III. Analysis:

A. Calibration:

All acceptance criteria were met.

B. Blanks:

All acceptance criteria were met.

C. Duplicate Sample(s):

All acceptance criteria were met.

D. Instrument Performance Check:

All acceptance criteria were met.

E. Surrogate Recoveries:

All acceptance criteria were met.

F. Internal Standards:

All acceptance criteria were met.

G. Laboratory Control Sample (LCS)

All acceptance criteria were met.

H. Matrix Spike(MS)/Matrix Spike Duplicate(MSD)
Not applicable.

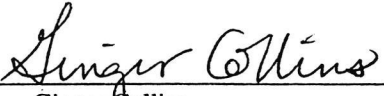
I. Analytical Exception:
None.

J. Other:
None

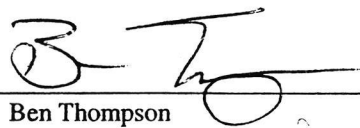
IV. Sampling Equipment Exceptions:
None.

V. Documentation Exceptions:
None.

VI. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

SIGNED: 
Ginger Collins
Analytical Chemist

DATE: 4/8/03

REVIEWED: 
Ben Thompson
Organics Supervisor

DATE: 4/9/03

**SAMPLE DATA
SUMMARY**

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-01

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904001

Level: (low/med) LOW Lab File ID: 904001R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/27/03

Dilution Factor: 1.93

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|-------|---|
| 75-01-4 | Vinyl chloride | 31 | U |
| 79-01-6 | Trichloroethene | 21900 | E |
| 127-18-4 | Tetrachloroethene | 200 | |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-02

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904002

Level: (low/med) LOW

Lab File ID: 904002R.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/27/03

Dilution Factor: 2.01

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|--------|---|
| 75-01-4 | Vinyl chloride | 32 | U |
| 79-01-6 | Trichloroethene | 102000 | E |
| 127-18-4 | Tetrachloroethene | 517 | |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-02DUP

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904002D

Level: (low/med) LOW

Lab File ID: 904002D.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/27/03

Dilution Factor: 2.01

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|--------|---|
| 75-01-4 | Vinyl chloride | 32 | U |
| 79-01-6 | Trichloroethene | 103000 | E |
| 127-18-4 | Tetrachloroethene | 501 | |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-03

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904003

Level: (low/med) LOW Lab File ID: 904003.D

GC Column: , DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 1.12

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|-------|---|
| 75-01-4 | Vinyl chloride | 18 | U |
| 79-01-6 | Trichloroethene | 67100 | E |
| 127-18-4 | Tetrachloroethene | 578 | |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-04

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904004

Level: (low/med) LOW

Lab File ID: 904004.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 0.50

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|-------|---|
| 75-01-4 | Vinyl chloride | 9 | |
| 79-01-6 | Trichloroethene | 76100 | E |
| 127-18-4 | Tetrachloroethene | 443 | |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-05

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904005

Level: (low/med) LOW

Lab File ID: 904005.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 0.58

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|-------|---|
| 75-01-4 | Vinyl chloride | 15 | |
| 79-01-6 | Trichloroethene | 57100 | E |
| 127-18-4 | Tetrachloroethene | 602 | E |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-05DL

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904005DL

Level: (low/med) LOW

Lab File ID: 904005R.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 04/08/03

Dilution Factor: 3.19

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|-------|---|
| 75-01-4 | Vinyl chloride | 51 | U |
| 79-01-6 | Trichloroethene | 47500 | E |
| 127-18-4 | Tetrachloroethene | 459 | |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-06

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904006

Level: (low/med) LOW Lab File ID: 904006R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 1.06

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|-------|---|
| 75-01-4 | Vinyl chloride | 17 | U |
| 79-01-6 | Trichloroethene | 53000 | E |
| 127-18-4 | Tetrachloroethene | 528 | |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-07

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904007

Level: (low/med) LOW Lab File ID: 904007R.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 0.36

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|-----|---|
| 75-01-4 | Vinyl chloride | 6 | U |
| 79-01-6 | Trichloroethene | 204 | |
| 127-18-4 | Tetrachloroethene | 53 | |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MD-AS-08

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air Lab Sample ID: 904008

Level: (low/med) LOW Lab File ID: 904008.D

GC Column: DB-VRX ID: 0.25 (mm) Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 0.72

CONCENTRATION UNITS:

CAS NO. COMPOUND PPTV Q

| | | | |
|----------|-------------------|-------|---|
| 75-01-4 | Vinyl chloride | 15 | |
| 79-01-6 | Trichloroethene | 56000 | E |
| 127-18-4 | Tetrachloroethene | 582 | |

VOLATILE ORGANICS ANALYSIS DATA SHEET

MD-AS-B1

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: 904009

Level: (low/med) LOW

Lab File ID: 904009.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/28/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|------|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 25 | |
| 127-18-4 | Tetrachloroethene | 4 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

XB2_0327

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: XB2_0327

Level: (low/med) LOW

Lab File ID: XB2_0327.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 03/27/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|------|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

XB2_0408

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: XB2_0408

Level: (low/med) LOW

Lab File ID: XB2_0408.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 04/08/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|------|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

XB1_0401

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040

Matrix: (air/soil/water) Air

Lab Sample ID: XB1_0401

Level: (low/med) LOW

Lab File ID: XB1_0401.D

GC Column: DB-VRX ID: 0.25 (mm)

Date Received: 03/21/03

Date Analyzed: 04/01/03

Dilution Factor: 0.25

CONCENTRATION UNITS:

| CAS NO. | COMPOUND | PPTV | Q |
|----------|-------------------|------|---|
| 75-01-4 | Vinyl chloride | 4 | U |
| 79-01-6 | Trichloroethene | 4 | U |
| 127-18-4 | Tetrachloroethene | 4 | U |

QC SUMMARY

2A
VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

| | EPA SAMPLE NO. | SMC1 # | TOT OUT |
|----|-------------------|-----------|------------|
| 01 | XB2_0327 | 96 | 0 |
| 02 | MD-AS-01 | 77 | 0 |
| 03 | MD-AS-02 | 89 | 0 |
| 04 | MD-AS-02DUP | 105 | 0 |
| 05 | MD-AS-03 | 108 | 0 |
| 06 | MD-AS-04 | 117 | 0 |
| 07 | MD-AS-05 | 121 | 0 |
| 08 | MD-AS-06 | 106 | 0 |
| 09 | MD-AS-07 | 93 | 0 |
| 10 | MD-AS-08 | 104 | 0 |
| 11 | MD-AS-B1 | 84 | 0 |

SMC1 ppbv = Bromofluorobenzene

QC LIMITS
(70-130)

Column to be used to flag recovery values
* Values outside of contract required QC limits
D System Monitoring Compound diluted out

2A
VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040

| | EPA SAMPLE NO. | SMC1 # | TOT OUT |
|----|-------------------|-----------|------------|
| 01 | XB1_0401 | 104 | 0 |
| 02 | XB2_0408 | 111 | 0 |
| 03 | MD-AS-05DL | 98 | 0 |

SMC1 ppbv = Bromofluorobenzene

QC LIMITS
(70-130)

Column to be used to flag recovery values
* Values outside of contract required QC limits
D System Monitoring Compound diluted out

3
DUPLICATES
VOLATILE ORGANIC ANALYSIS

Lab Name: Applied Sciences Laboratory
Lab Code: CVO
Lab File ID: C:\HPCHEM\1\DATA\032703G1\904002.D
Lab File ID: C:\HPCHEM\1\DATA\032703G1\904002D.D
Instrument ID: GODZILLA
GC Column: DB-VRX 0.25mm x 60 meters

Project No.: 179143.AS.01
Lab Batch No.: 9040
Lab Sample ID: 904002
Date Analyzed: 03/27/03
Concentration Units: PPTV

| ANALYTE | CONTROL LIMIT | SAMPLE | DUPLICATE | RPD (%) |
|-------------------|------------------|----------|-----------|------------|
| Vinyl chloride | ± 30 | 32 U | 32 U | -- |
| Trichloroethene | ± 30 | 102000 E | 103000 E | 1.0 |
| Tetrachloroethene | ± 30 | 517 | 501 | 3.1 |

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

XB2_0327

Lab Name: CH2M HILL ASL Contract: 179143.AS.01

Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040

Lab File ID: XB2_0327.D Lab Sample ID: XB2_0327

Date Analyzed: 03/27/03 Time Analyzed: 11:05

GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

| | EPA SAMPLE NO. | LAB SAMPLE ID | LAB FILE ID | TIME ANALYZED |
|----|-------------------|------------------|----------------|------------------|
| 01 | 20 PPTV STD | LEVEL2 | LEVEL2.D | 12:24 |
| 02 | 50 PPTV STD | LEVEL3 | LEVEL3.D | 13:03 |
| 03 | 100 PPTV STD | LEVEL4 | LEVEL4.D | 13:45 |
| 04 | 200 PPTV STD | LEVEL5 | LEVEL5.D | 14:26 |
| 05 | 10 PPTV STD | LEVEL1 | LEVEL1R.D | 15:06 |
| 06 | 1000 PPTV STD | LEVEL6 | LEVEL6.D | 15:46 |
| 07 | MD-AS-01 | 904001 | 904001R.D | 22:00 |
| 08 | MD-AS-02 | 904002 | 904002R.D | 22:44 |
| 09 | MD-AS-02DUP | 904002D | 904002D.D | 23:28 |
| 10 | MD-AS-03 | 904003 | 904003.D | 00:18 |
| 11 | MD-AS-04 | 904004 | 904004.D | 01:09 |
| 12 | MD-AS-05 | 904005 | 904005.D | 02:00 |
| 13 | MD-AS-06 | 904006 | 904006R.D | 02:44 |
| 14 | MD-AS-07 | 904007 | 904007R.D | 03:42 |
| 15 | MD-AS-08 | 904008 | 904008.D | 04:37 |
| 16 | MD-AS-B1 | 904009 | 904009.D | 05:25 |

COMMENTS:

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

XB1_0401

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
Lab File ID: XB1_0401.D Lab Sample ID: XB1_0401
Date Analyzed: 04/01/03 Time Analyzed: 10:53
GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N
Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

| | EPA SAMPLE NO. | LAB SAMPLE ID | LAB FILE ID | TIME ANALYZED |
|----|-------------------|------------------|----------------|------------------|
| 01 | 10 PPTV STD | LEVEL1 | LEVEL1.D | 11:32 |
| 02 | 20 PPTV STD | LEVEL2 | LEVEL2.D | 12:16 |
| 03 | 50 PPTV STD | LEVEL3 | LEVEL3.D | 13:12 |
| 04 | 100 PPTV STD | LEVEL4 | LEVEL4.D | 13:52 |
| 05 | 200 PPTV STD | LEVEL5 | LEVEL5.D | 14:36 |
| 06 | 1000 PPTV STD | LEVEL6 | LEVEL6.D | 15:24 |

COMMENTS:

4A
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

XB2_0408

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
Lab File ID: XB2_0408.D Lab Sample ID: XB2_0408
Date Analyzed: 04/08/03 Time Analyzed: 13:35
GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N
Instrument ID: GC/MS - G

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

| | EPA SAMPLE NO. | LAB SAMPLE ID | LAB FILE ID | TIME ANALYZED |
|----|-------------------|------------------|----------------|------------------|
| 01 | CV1_0408 | CV1_0408 | CV1_0408.D | 14:22 |
| 02 | MD-AS-05DL | 904005DL | 904005R.D | 15:03 |

COMMENTS:

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040
 Instrument ID: GC/MS - G Calibration Date(s): 03/27/03 03/27/03
 Heated Purge (Y/N): N Calibration Times: 12:24 15:46
 GC Column: DB-VRX ID: 0.25 (mm)

LAB FILE ID:

RRF1 = LEVEL1R.D RRF2 = LEVEL2.D RRF3 = LEVEL3.D
 RRF4 = LEVEL4.D RRF5 = LEVEL5.D RRF6 = LEVEL6.D

| COMPOUND | RRF1 | RRF2 | RRF3 | RRF4 | RRF5 | RRF6 | <u>RRF</u> | % RSD |
|--------------------|-------|-------|-------|-------|-------|-------|------------|----------|
| Vinyl chloride | 0.110 | 0.096 | 0.102 | 0.130 | 0.133 | 0.111 | 0.114 | 13.1 |
| Trichloroethene | 0.042 | 0.029 | 0.030 | 0.034 | 0.034 | 0.028 | 0.033 | 15.8 |
| Tetrachloroethene | 0.032 | 0.022 | 0.022 | 0.025 | 0.029 | 0.023 | 0.025 | 16.0 |
| Bromofluorobenzene | 0.591 | 0.760 | 0.621 | 0.535 | 0.573 | 0.433 | 0.586 | 18.3 |

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
 Instrument ID: GC/MS - G Calibration Date(s): 04/01/03 04/01/03
 Heated Purge (Y/N): N Calibration Times: 11:32 15:24
 GC Column: DB-VRX ID: 0.25 (mm)

LAB FILE ID:

RRF1 = LEVEL1.D RRF2 = LEVEL2.D RRF3 = LEVEL3.D
 RRF4 = LEVEL4.D RRF5 = LEVEL5.D RRF6 = LEVEL6.D

| COMPOUND | RRF1 | RRF2 | RRF3 | RRF4 | RRF5 | RRF6 | <u>RRF</u> | % RSD |
|--------------------|-------|-------|-------|-------|-------|-------|------------|----------|
| Vinyl chloride | 0.067 | 0.090 | 0.097 | 0.086 | 0.103 | 0.101 | 0.091 | 14.7 |
| Trichloroethene | 0.040 | 0.029 | 0.027 | 0.022 | 0.024 | 0.024 | 0.027 | 23.6 |
| Tetrachloroethene | 0.025 | 0.023 | 0.021 | 0.019 | 0.021 | 0.021 | 0.022 | 9.4 |
| Bromofluorobenzene | 0.520 | 0.477 | 0.600 | 0.481 | 0.541 | 0.566 | 0.531 | 9.1 |

7A
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
Instrument ID: GC/MS - G Calibration Date: 04/08/03 Time: 14:22
Lab File ID: CV1_0408.D Init. Calib. Date(s): 04/01/03 04/01/03
Heated Purge: (Y/N) N Init. Calib. Times: 11:32 15:24
GC Column: DB-VRX ID: 0.25 (mm)

| COMPOUND | RRF | RRF4 | | % D | MAX % D |
|--------------------|-------|-------|--|-------|------------|
| Vinyl chloride | 0.091 | 0.097 | | -6.7 | 30 |
| Trichloroethene | 0.027 | 0.025 | | 10.0 | 30 |
| Tetrachloroethene | 0.022 | 0.028 | | -28.9 | 30 |
| Bromofluorobenzene | 0.531 | 0.470 | | 11.5 | 30 |

8A
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 032703 SDG No.: 9040
 Lab File ID (Standard): LEVEL4.D Date Analyzed: 03/27/03
 Instrument ID: GC/MS - G Time Analyzed: 13:45
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

| | IS1ppbv AREA # | RT # | IS2ppbv AREA # | RT # | IS3ppbv AREA # | RT # |
|-------------------|-------------------|-------|-------------------|-------|-------------------|-------|
| 24 HOUR STD | 1236 | 14.31 | 5098 | 16.90 | 3513 | 21.56 |
| UPPER LIMIT | 1730 | 14.81 | 7137 | 17.40 | 4918 | 22.06 |
| LOWER LIMIT | 742 | 13.81 | 3059 | 16.40 | 2108 | 21.06 |
| EPA SAMPLE NO. | | | | | | |
| 01 MD-AS-01 | 1084 | 14.22 | 5051 | 16.87 | 3489 | 21.52 |
| 02 MD-AS-02 | 1150 | 14.25 | 5324 | 16.89 | 3983 | 21.53 |
| 03 MD-AS-02DUP | 1180 | 14.27 | 5438 | 16.90 | 3877 | 21.52 |
| 04 MD-AS-03 | 1269 | 14.29 | 5905 | 16.92 | 4167 | 21.55 |
| 05 MD-AS-04 | 1220 | 14.31 | 6097 | 16.93 | 4087 | 21.55 |
| 06 MD-AS-05 | 1257 | 14.32 | 6220 | 16.93 | 4138 | 21.54 |
| 07 MD-AS-06 | 1294 | 14.29 | 5831 | 16.90 | 4456 | 21.50 |
| 08 MD-AS-07 | 1264 | 14.30 | 6214 | 16.93 | 4273 | 21.53 |
| 09 MD-AS-08 | 1327 | 14.32 | 6686 | 16.94 | 4500 | 21.55 |
| 10 MD-AS-B1 | 1256 | 14.34 | 5806 | 16.96 | 3462 | 21.57 |

IS1 ppbv = Bromochloromethane
 IS2 ppbv = 1,4-Difluorobenzene
 IS3 ppbv = Chlorobenzene-d5

AREA UPPER LIMIT = +40% of internal standard area
 AREA LOWER LIMIT = - 40% of internal standard area
 RT UPPER LIMIT = +0.50 minutes of internal standard RT
 RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column to be used to flag values outside QC limit with an asterisk.

* Values outside of contract required QC limits

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
 Lab File ID (Standard): LEVEL4.D Date Analyzed: 04/01/03
 Instrument ID: GC/MS - G Time Analyzed: 13:52
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

| | IS1ppbv AREA # | RT # | IS2ppbv AREA # | RT # | IS3ppbv AREA # | RT # |
|-------------------|-------------------|-------|-------------------|-------|-------------------|-------|
| 24 HOUR STD | 2024 | 14.32 | 9315 | 16.93 | 5844 | 21.57 |
| UPPER LIMIT | 2834 | 14.82 | 13041 | 17.43 | 8182 | 22.07 |
| LOWER LIMIT | 1214 | 13.82 | 5589 | 16.43 | 3506 | 21.07 |
| EPA SAMPLE NO. | | | | | | |
| 01 XB2_0408 | 1645 | 14.19 | 7560 | 16.82 | 3762 | 21.47 |

IS1 ppbv = Bromochloromethane
 IS2 ppbv = 1,4-Difluorobenzene
 IS3 ppbv = Chlorobenzene-d5

AREA UPPER LIMIT = +40% of internal standard area

AREA LOWER LIMIT = - 40% of internal standard area

RT UPPER LIMIT = +0.50 minutes of internal standard RT

RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column to be used to flag values outside QC limit with an asterisk.

* Values outside of contract required QC limits

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: CH2M HILL ASL Contract: 179143.AS.01
 Lab Code: CVO Case No.: 9040 SAS No.: 040103 SDG No.: 9040
 Lab File ID (Standard): CV1_0408.D Date Analyzed: 04/08/03
 Instrument ID: GC/MS - G Time Analyzed: 14:22
 GC Column: DB-VRX ID: 0.25 (mm) Heated Purge: (Y/N) N

| | IS1ppbv AREA # | RT # | IS2ppbv AREA # | RT # | IS3ppbv AREA # | RT # |
|-------------------|-------------------|-------|-------------------|-------|-------------------|-------|
| 24 HOUR STD | 1721 | 14.16 | 7710 | 16.81 | 4958 | 21.45 |
| UPPER LIMIT | 2409 | 14.66 | 10794 | 17.31 | 6941 | 21.95 |
| LOWER LIMIT | 1033 | 13.66 | 4626 | 16.31 | 2975 | 20.95 |
| EPA SAMPLE NO. | | | | | | |
| 01 MD-AS-05DL | 1878 | 14.13 | 8823 | 16.78 | 5591 | 21.43 |

IS1 ppbv = Bromochloromethane

IS2 ppbv = 1,4-Difluorobenzene

IS3 ppbv = Chlorobenzene-d5

AREA UPPER LIMIT = +40% of internal standard area

AREA LOWER LIMIT = - 40% of internal standard area

RT UPPER LIMIT = +0.50 minutes of internal standard RT

RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column to be used to flag values outside QC limit with an asterisk.

* Values outside of contract required QC limits

**Documentation of Environmental Indicator Determination
in accordance with EPA Interim Final Guidance 2/5/99**

**RCRA Corrective Action
Environmental Indicator (EI) RCRA Info code (CA725)**

Current Human Exposures Under Control

Facility Name: Modine Manufacturing Company
Facility Address: 179 Sunset Drive, Camdenton, Missouri
Facility EPA ID #: MOD 062439351

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

 X If yes - check here and continue with #2 below.

 If no - re-evaluate existing data, or

 If data are not available skip to #6 and enter "IN" (more information needed) status code.

2. Are groundwater, soil, surface water, sediments or air **media** known or reasonably suspected to be "**contaminated**"¹ above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

| | <u>Yes</u> | <u>No</u> | <u>?</u> | <u>Rationale / Key Contaminants</u> |
|-----------------------------|---------------|---------------|---------------|---|
| Groundwater | <u> X </u> | <u> </u> | <u> </u> | Concentrations exceed criteria |
| Air (indoors) ² | <u> </u> | <u> X </u> | <u> </u> | Testing found concentrations below OSHA levels (typically < 0.1% of OSHA level) |
| Surface Soil (e.g., <2 ft) | <u> </u> | <u> X </u> | <u> </u> | Soil removed to below site specific cleanup levels |
| Surface Water | <u> </u> | <u> X </u> | <u> </u> | No observed impact |
| Sediment | <u> </u> | <u> X </u> | <u> </u> | No observed impact |
| Subsurf. Soil (e.g., >2 ft) | <u> </u> | <u> X </u> | <u> </u> | Soil removed to below site specific cleanup levels |
| Air (outdoors) | <u> </u> | <u> X </u> | <u> </u> | Testing found concentrations comparable to ambient outdoor conditions |

 If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

 X If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an

explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_____ If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s): Modine Manufacturing Company (Modine) manufactures heat transfer products at the Camdenton, Missouri facility. Modine entered into a Corrective Action Abatement Order on Consent (AOC) with the Missouri Department of Natural Resources (MDNR) in July 1999. Activities conducted to comply with the AOC are complete and the appropriate documentation has been provided to the regulatory agencies.

Groundwater - Groundwater is contaminated with trichloroethene (TCE) at concentrations above the maximum contaminant level (MCL) of 5 parts per billion (ppb). Concentrations above the MCL have been detected in groundwater monitoring wells located at the facility, at an adjacent former publicly-owned treatment works (POTW) - former Huelett Lagoon, and in a nearby municipal water supply well - Mulberry Well. Current operations at the Modine facility do not impact groundwater.

Indoor air - EPA's *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* was developed for use in residential settings and EPA does not expect this guidance be used for settings that are primarily occupational. OSHA and EPA have agreed that OSHA generally will take the lead role in addressing occupational exposures. Indoor air at the Modine facility was evaluated during 2003 and all contaminants detected had concentrations less than the lower of: (1) Permissible Exposure Limit (PEL) set by the Occupational Safety and Health Administration (OSHA) to protect occupational health of workers, (2) Recommended Exposure Level (REL) set by the National Institute for Occupation Safety and Health (NIOSH), and (3) Threshold Limit Value (TLV) set by the American Conference of Governmental Industrial Hygienists (ACGIH). Based on these results, the EI for indoor air has been achieved at the Modine facility.

Surface soil and subsurface soil - Contaminated surface and subsurface soil was present at the west side of the Modine plant. The soil was cleaned up during 2002 to the calculated site-specific soil cleanup action levels, approved by MDNR, for the Modine facility (RCRA Corrective Action Technical Memorandum, CH2M HILL, July 2002). Contaminated soil with concentrations in excess of CALM Soil Target Concentrations (STARC) Leaching to Groundwater (C_{LEACH}) levels were originally excavated. During the corrective action, site-specific C_{LEACH} action levels were developed. Impacted surface and subsurface soil with concentrations above the site-specific action levels were excavated and removed, the excavation was consequently backfilled with clean soil and restored. The possibility exists that contaminated soil, at concentrations below site specific levels, is present under the manufacturing building. However, as previously indicated, the indoor air human exposure pathway has been evaluated at the Modine facility and found to achieve

the environmental indicator.

Surface water - Modine has a General Storm Water Permit issued by the department's Water Pollution Control Program (Permit Number MO-R203055). The facility storm sewer directs surface runoff to the southern end of the site. Runoff not collected in the storm sewer flows southwest-west to a series of manhole collection points directing runoff to a lift station leading to the Camdenton POTW (*Final Preliminary Assessment Report, Jacobs Engineering, September 1992.*) Sampling of stormwater runoff and a stream and spring downgradient of the site showed no VOCs detected in surface water (*Environmental Risk Assessment of Former Drum Storage Areas, Law Engineering and Environment, August 16, 1994.*)

Sediment - Sediments in the downgradient stream were not sampled. Because no contaminants were found in the surface water from the stream, it can be assumed that sediments have not been impacted from operations at the Modine facility.

Outdoor air - Outdoor air at the Modine facility was evaluated during 2003 concurrently with indoor air. Low concentrations of two compounds were detected in the outdoor air sample. These concentrations were consistent with ambient background concentrations.

- Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

| <u>"Contaminated" Media</u> | Residents | Workers | Day-Care | Construction | Trespassers | Recreation | Food ³ |
|------------------------------------|-----------|-----------|-----------|--------------|-------------|------------|-------------------|
| Groundwater | <u>No</u> | <u>No</u> | <u>No</u> | <u>No</u> | | | <u>No</u> |
| Air (indoors) | — | — | — | | | | |
| Soil (surface, e.g., <2 ft) | — | — | — | — | — | — | — |
| Surface Water | — | — | | | — | — | — |
| Sediment | — | — | | | — | — | — |
| Soil (subsurface e.g., >2 ft) | | | | — | | | — |
| Air (outdoors) | — | — | — | — | — | | — |

Instructions for Summary Exposure Pathway Evaluation Table:

- Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated" as identified in #2 above.
- Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media - Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential

"Contaminated" Media - Human Receptor combinations (pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

- ☒ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).
- ☐ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.
- ☐ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

Rationale and Reference(s): Groundwater has no direct pathway for any media-receptor combination as the groundwater is inaccessible to receptors. The contaminated water supply well has been taken out of service and no longer is a source of water supply for the City of Camdenton. Existing water supply wells for the City are being monitored for water quality and no TCE has been detected. The groundwater – air (indoor or outdoor) human receptor pathway has been evaluated through the 2003 air quality assessment. Indoor and outdoor air at the Modine facility was found to achieve the environmental indicator.

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be "**significant**"⁴ (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?
- ☐ If no (exposures cannot be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."
 - ☐ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why

the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s): _____

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be "unacceptable") - continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s): _____

6. Check the appropriate RCRA Info status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

YE YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Modine Manufacturing Company facility, EPA ID #MOD 062439351, located at 179 Sunset Drive, Camdenton, Missouri under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

_____ NO - "Current Human Exposures" are NOT "Under Control."

Facility: Modine - Camdenton, MO

CA725

Page 6 of 8

____ IN - More information is needed to make a determination.

Completed by: (Signature) _____ Date _____
(Print) Christine Kump-Mitchell, P.E.
(Title) Environmental Engineer

Supervisor: (Signature) _____ Date _____
(Print) R. Bruce Stuart, P.E., R.G.
(Title) Groundwater Unit Chief
(EPA Region or State) Missouri Department of Natural Resources

Locations where References may be found:

Missouri Department of Natural Resources

1738 East Elm Street, Jefferson City, Missouri

Hazardous Waste Program files:

Modine Manufacturing Company, Camdenton - TSD and GMW Files

Sundstrand - Superfund Files

Contact telephone and e-mail numbers

(Name) Christine Kump-Mitchell, P.E.

(Phone #) 314-416-2960

(E-mail) nrkumpc@mail.dnr.state.mo.us

Final Note: The Human Exposures EI is a Qualitative Screening of exposures and the determinations within this document should not be used as the sole basis for restricting the scope of more detailed (e.g., site-specific) assessments of risk.

ref: ca725epa.doc

Footnotes

1. "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).
2. Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggests that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.
3. Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)
4. If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

BACKGROUND

Definition of Environmental Indicators (for RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EIs developed to date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EIs are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI is for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in the RCRA Info national database ONLY as long as they remain true (i.e., RCRA Info status codes must be changed when the regulatory authorities become aware of contrary information).



Client Modine MFG

Address 636 Sunset Dr

City Camdenton

State MO

ZIP 65020



Accredited since 1978
Lab ID 101077

Parker Services Project Number 03-100-040-

Survey Date August 11 & 12, 2003

| SAMPLE DATA | | | | | ANALYTICAL RESULTS | | | |
|-------------|-------------------------------------|------------------------|-------------|------------------|---------------------------------------|----------|-----------|-----------|
| Sample # | Employee / Operation | Contaminant | Air Vol (L) | Total Time (min) | Concentration | OSHA PEL | ACGIH TLV | Other OEL |
| C-2 | Turret Press, West End of Weld Area | Cis-1,2-Dichloroethene | 15.9 | 464 | <0.2 ppm | 200 ppm | 200 ppm | |
| | 8/11/03 | Methylene chloride | | | <0.2 ppm | 25 ppm | 50 ppm | |
| | | Tetrachloroethene | | | <0.1 ppm | 100 ppm | 25 ppm | |
| | | Trichloroethene | | | <0.1 ppm | 100 ppm | 50 ppm | |
| | | Vinyl chloride | | | <0.02 ppm | 1 ppm | 1 ppm | |
| C-13 | Turret Press, West End of Weld Area | Cis-1,2-Dichloroethene | 15.8 | 459 | <0.2 ppm | 200 ppm | 200 ppm | |
| | 8/12/03 | Methylene chloride | | | <0.2 ppm | 25 ppm | 50 ppm | |
| | | Tetrachloroethene | | | <0.1 ppm | 100 ppm | 25 ppm | |
| | | Trichloroethene | | | <0.1 ppm | 100 ppm | 50 ppm | |
| | | Vinyl chloride | | | <0.02 ppm | 1 ppm | 1 ppm | |
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| COMMENTS: | | | | | METHODS: NIOSH 1003, 1005, 1022, 1007 | | | |

ppm - parts per million
ppb - parts per billion
BDL - Below analytical detection limit
NA - Not Applicable
NE - Not Established

mg/m³ - milligrams per cubic meter
 μg/m³ - micrograms per cubic meter
 C - Ceiling limit not to be exceeded
 f/cc - fibers per cubic centimeter
 μg/ft² - micrograms per square foot

STEL - Short Term Excursion Limit or 15 minute Time
Weighted Average Exposure Limit
OEL - Occupational Exposure Limit